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## STATE SUPERVISION OF ELECTRIC WIRING.

As noted in these columns a week ago, there is a movement on foot in Nebraska looking toward the creation of a state department of electric wiring there. At this time it has not been made very clear just what powers and duties the proposed office may be expected to include, if the efforts of those who are responsible for the movement prove to be successful. It is intimated, however, that the department will at least have supervision over power-transmission lines through rural districts and also over the circuits of interurban electric railways. It may be, too, that electrical inspection in small towns having no municipal electrical inspector will be undertaken.

Whatever may become of this movement finally, it is certainly a very interesting one. It contains suggestions, too, well worth consideration not only in this particular state, but in many other sections of the country as well. While neither personal injuries nor fire losses from high-tension transmission lines have, so far as the records go, become alarmingly frequent anywhere, it must be admitted that such casualties do sometimes occur. Properly managed inspection on the part of state officials might reasonably be expected to cause these to be even less frequent than they now are. Moreover, when an accident did occur the inspection department could doubtless be of great usefulness in seing that no injustice was done in subsequent efforts to fix the blame for its occurrence.

In towns without electrical inspectors—and in farming districts where electricity is used extensively, also—such a department could be of even greater service. Very many of the smaller towns are without any sort of municipal supervision of interior electric wiring whatsoever, and where the small town does have an inspector of wiring his work is often very far from efficient. The salary is frequently so small as to make it impossible to secure a good man for the place; and even when a proficient inspector can be secured, his efforts may be robbed of much of their effectiveness by local political conditions. State supervision of wiring in such places as these would certainly be more independent of local politics, as a rule, than locally provided supervision could be expected to be, and it is reasonable to suppose that the State could provide men better trained for making inspections.

## PERMANENT AND EFFECTIVE GROUNDING.

An insufficient earth connection in cases where circuits or apparatus require grounding, is sometimes worse than no grounding at all. The fact that the circuit or appliance is supposed to be grounded may lead to its being treated in a way which otherwise would not for a moment be thought of. With these statements, however, well informed electricians everywhere would probably agree; they contain no arguments that are new. On the other hand, a correct appreciation of what constitutes a really good ground is by no means universal.

Where water pipes are convenient the matter of obtaining an effective earth connection is relatively a simple one, as a rule. In the absence of these, the present practice seems to favor more than ever before the use of iron pipes driven into the earth for the purpose of attaching the ground wire. Engineers are agreed that good grounds may be thus obtained, but the practice certainly offers most ample opportunities to the careless or irresponsible for the making of poor earth connections, without the probability of these being subsequently discovered until some fatality or loss of property results. Hence better means than are now generally employed of making sure that ground connections are always really effective and will be permanent, would unquestionably be a decided step in a desirable direction.

In view of the foregoing conditions, the action of the Electrical Committee of the National Fire Protection Association is especially interesting. It will be recalled that this body, at its meeting in Boston, appointed a committee to look into the advisiability of changing the Code so as to specify grounds in terms of their current-carrying capacity and their resistance. Whether this sort of thing could be made practicable or not it is not proposed to consider here. If it can, however, such a revision of the Code would appear to be a timely one.

## DRAWN-STEEL FRAMES AND BASES FOR FAN MOTORS.

In an earlier issue this year we discussed editorially the development in design of fan motors for 1912. Among other statements we said: "Probably the most striking feature to be noted is the employment, by several makers, of drawn steel or brass instead of cast iron for the casing and base of the machine. This alone meant a reduction in total weight of some forty or more per cent." Investigation has indicated that this is not entirely true. The use of drawn steel for the casing and base of certain types of fan motors has resulted in a reduction of from 20 to 40 per cent in weight. This represents decidedly the major portion of the reduction in weight that has been secured. In addition to the use of drawn steel for the casing and base, however, it is claimed that some refinements have been made in the design of the motor which have also had their effect in lessening the weight of the completed fan.

## DEFECTS IN HYDROELECTRIC PLANT DESIGN.

One of the chief differences between hydroelectric and steam-plant practice is the remarkable flexibility of the latter compared with the rigidity of the former. The point is a very important one. Mistakes in design may be to some extent corrected in the steam plant when operating experience proves that a different arrangement should have been made. Such is rarely the case with a water-power installation. The cost of the headworks, canal system, forebay, penstocks, wheel foundations and tailrace seldom permits any extended modification of design after a plant goes into service. Errors in location carry far heavier penalties than poor judgment in placing steam-plant equipment, and it is very difficult to provide for an altered path of water flowage in comparison with the inexpensiveness of relocating steam lines and exhaust mains.

Inferior plant design leads in water-power installations to less efficient operation, often to excessive fixed charges, and not seldom to interrupted service. A recent survey of a number of hydroelectric stations of small capacity brought out a number of points worth considering in connection with the initial designs. In one plant, insufficient space had been set aside for the turbines and generators, although the units were of the direct-connected type. Four machines were installed, the station lying immediately at the foot of the dam. On account of the limitations of the building dimensions, it was necessary to place two of the machines with their axes at right angles to the axes of the other units, making the installation unsymmetrical and consequently less convenient from the operating point of view than in plants where the axes of the generating units are parallel. This was not the worst feature, however, since the cramped turbine room made it necessary to run two of the penstocks around the end of the plant on the outside, in order to feed water to the two units farthest removed from the dam. The friction losses were seriously increased as a result, and trouble from ice formation was experienced. The appropriation of enough money to have extended the original turbine room slightly would have given the operating company a better station and have insured its use of water along the most efficient lines possible under the local conditions.

In another instance the installation was designed with tail-race openings so small that they were filled with water when the wheels were operating at 70-per-cent gate opening. This meant that a large investment in hydraulic and electric generating capacity must stand practically idle until sufficient egress for the discharged water could be furnished. Experience in another station subjected to very severe winter weather proved the wisdom of installing the exciters upon the shafts of the main generating units, since in the earlier days of the plant's service

the capacity was seriously crippled from the freezing of the water in the small penstocks. Again, the installation of the prime movers and generators in a room having a sharp angle between the two halves made much trouble from the operating point of view. Inability to see all the machines in times of emergency threatened the stability of the service. The cost of labor in non-symmetrical plants tends to run considerably higher for a given capacity than it does in stations where the machinery is placed uniformly. Still another lesson indicated by the examination of the various hydroelectric properties was the importance of preventing splashing of water against the sides of the retaining wall above the power house, since in cold weather this formed an overhanging shelf several feet thick and heavy enough to threaten the safety of the concrete abutments above the power station. Economy was served in another plant without sacrifice of efficiency by installing the wheels and draft tubes outside the generator-room walls and between the downstream face of the dam and the station wall. The reduction in investment cost came through the avoiding of any need of waterproofing the station walls and floors, and the strength of the former was greatly decreased by the installation of generators and switchboard equipment instead of complete hydraulic apparatus inside the building. A critical but friendly study of station designs often indicates methods of treating local problems which save money when applied elsewhere.

## REVERSAL OF THE INDUCTION MOTOR.

The direction of rotation of a three-phase induction motor is determined by the order of connection of the three phases, and it is a simple matter to reverse the direction by so changing the connections to the stator as to reverse the direction of rotation of the rotating magnetic field, which is produced by current in these windings. With the ordinary three-wire circuit and delta connection it is sufficient to interchange two of the lead wires.

In a case which came to notice recently this interchange was inadvertently made and resulted in the improper operation of an elevator motor, thereby producing considerable damage.

Several three-phase elevator motors with mechanical control were connected to a certain three-phase feeder. During the noon hour the cutover was made on this feeder, and in reconnecting, two of the three wires were transposed. On starting one of the elevators the motor ran in a direction opposite to that intended. The operator became excited and jumped from the car, which ran to the end of its travel. Here there was an automatic cutout, but as the cutout was set for rotation in the opposite direction it did not act properly, and there was, consequently, a bad smashup, with a narrow escape from loss of life.

This example makes it evident that such a contingency has not been provided for in the design of such elevator apparatus, and the mistake is one which can easily be made if the precaution is not taken of trying out the elevator as soon as the connection is made. It would be a simple matter to construct a detector for indicating the direction of rotation of a magnetic field, and this could be used by wiremen to test the leads after a cutover and see that the arrangement or the order of the phases was the same as before, or in conformity with any particular plan that might be laid down.

Wiremen who have occasion to handle this type of motor should be very cautious and see to it that the leads are connected to the proper terminals, especially in a case like the above where alterations are made in an existing installation, which will not be given the usual test following an initial connection.

## SEATTLE CONVENTION OF THE NATIONAL ELECTRIC LIGHT ASSOCIATION.

A review of the conditions attending the preliminaries for the convention of the National Electric Light Association, which will be held at Seattle, Wash., June 10-14, indicates plenty of enthusiasm, plans well laid and the probability of a very gratifying attendance. Reservations for accommodations on the special trains are coming in rapidly, and the master of transportation and his assistants report the most satisfactory progress. The train de luxe which will leave New York on May 26, will carry a notable contingent, and the other trains leaving Boston, Chicago and St. Louis, making a faster run to the convention, will be filled with the big men of the industry. Anyone interested in this phase of electrical development might well make an extraordinary sacrifice to participate in one of these trips if it is his intention to visit the Northwest at any time within the next six months or a year.

On another page of this issue the program of the business to be transacted at the general, executive, technical, accounting, commercial, power transmission and public sessions, is published. Last year it was thought that the program had reached the pinnacle of imposing proportions and significance of material. Last year the work was spread out over four days. The general program this year is equal in importance with that of a year ago. This year, however, it will have to be digested in three days with evening sessions on two; so that the man who imagines that he goes to Seattle this year for a junket had better take a look at the program and then make up his mind for hard work.

The Commercial Section is well represented upon the program, and a big lot of the work will fall upon this lusty new department of Association effort. The power transmission section looms up conspicuously, and as it will be in its element among the long-distance, high-tension transmission lines of the Northwest, there should be an attendance of the most desirable ones and much good should come from the presentation of papers and the discussion. The accounting section has a large program and the results should contribute a valuable addition to the work of the convention.

## Meeting of Commonwealth Edison Section.

Over 2,000 members of the Commonwealth Edison Section of the National Electric Light Association, employees of the company and guests, were present at the April meeting of the Section, held in Orchestra Hall, April 29, at which Samuel Insull, president of the company, was the speaker. This meeting celebrated the company's completion of a quarter century of corporate existence, having been established April 29, 1887, and Mr. Insull spoke on the subject of "Twenty-five Years of Central-Station Development in Chicago."

R. F. Schuchardt, chairman of the Section, turned the meeting over to Louis A. Ferguson, who delivered a fitting introductory address, in which he commented upon the vast development of the Insull properties. He said when Mr. Insull accepted the presidency of the Commonwealth Edison Company in 1892, its capital was $750,000, and the capacity of its generating stations 5,000 horsepower. Today the capital is over $40,000,000, and the generating capacity 400,000 horsepower.

Mr. Insull's address was illustrated by lantern slides showing the development of the central-station business. View of the first Appleton, Wis., and New York stations were shown, also views of early generating and control apparatus. These were compared with views of present-day equipment and stations, showing what wonderful advances have been made. Numerous charts, diagrams and curves were exhibited, and statistics presented showing what developments have taken place in all departments of the company's business. Operation in Chicago was also compared with operation in New York, Boston and elsewhere, showing the Chicago company to have a more desirable load curve.

Mr. Insull also spoke of railway electrification, and explained the advantages to be gained from a unified system of power supply, as compared with isolated generating plants. He said should all steam roads entering Chicago decide to electrify the power demands of all would be less than the power now supplied to the elevated and surface railways. The Edison company could easily take care of this business.

In concluding, Mr. Insull made an appeal to public-utility employees to appreciate the advantages that are before them. He cited a few incidents of the career of Thomas Edison and pointed out that better opportunities are now before those entering the business than was the case in the early days of the industry.

An enjoyable musical program was carried out by the N. E. L. A. Orchestra.

## Hinsdill Parsons, Vice-President and General Counsel, General Electric Company, Killed in Auto Accident.

Hinsdill Parsons, vice-president and general counsel of the General Electric Company, was instantly killed on the Old Albany Post Road at a point three miles southeast of Albany, N. Y., about 4 o'clock on the afternoon of April 28.

Mr. Parsons recently purchased a high-powered touring car in New York and the evening before made a trip to that city in the car, accompanied by B. H. Weisbrod of Amsterdam, secretary to Mr. Parsons, J. C. Nicholson of Schenectady was the chauffeur. The party left New York at 9 A. M., and planned to eat dinner at Schenectady.

The car went along all right until the hill at East Greenbush was reached. Mr. Parsons was at the wheel, when without warning a rear tire exploded,

Hinsdill Parsons.

lifting the heavy machine and throwing it into the ditch at the side of the road.

Mr. Parsons and the chauffeur were pinned under the overturned car. Mr. Parson's head was crushed, and undoubtedly he was instantly killed. Nicholson's right leg was broken.

Mr. Weisbrod who was on the rear seat, was thrown some distance and escaped with only slight injuries.

Mr. Parsons was active in electrical affairs and not only highly esteemed, but popular, and a familiar figure at Schenectady. He was born in Hoosick Falls, February 10, 1864, the son of the late Mr. and Mrs. J. Russell Parsons. He was educated at Trinity College and at Albany Law School.

In 1889 he was appointed patent attorney for the Walter A. Wood Harvester Company, of Hoosick Falls, and became associated with the General Electric Company, in 1894, as counsel, and in May, 1901, was elected vice-president. He was president of the Schenectady Illuminating Company, and was formerly active in the directorate of the Schenectady Railway Company, as well as other electrical interests.

Mr. Parsons is survived by his wife, who is a sister of A. W. Burchard, secretary to President Charles A. Coffin, of the General Electric Company, and three brothers, William, of Cohoes, and Egerton and Walter of New York City.

## Philadelphia Section Meetings.

The Philadelphia Electric Company Section, National Electric Light Association, held its Meter Department Branch meeting on April 11, and listened to a very interesting paper by Louis C. Smith on "Photography as Applied to Commercial Purposes." Mr. Smith took pictures by aid of electric light and had them developed and shown on the screen.

The Commercial Department Branch on April 22 was addressed by Milton V. Simpson, of the Tungstolier Company, of Conneaut, O., on "New-Business Campaigns We Have Conducted in Other Cities." The address was full of good points along the line of energetic and successful salesmanship in fields where strong competition exists.

The General Section turned out very strong to welcome Henry L. Doherty on April 15. "Thrift or Making the Wage Earner a Capitalist" was presented by Mr. Doherty in his convincing way, and his large and appreciative audience realized possibly as never before the advantage of systematic saving and judicious investment.

The Philadelphia Electric Company employees are enjoying the peace of mind which attends such welfare organizations as the N. E. L. A. Section, Employees' Beneficial Association, Service Annuity Department, and an Athletic Association; and the next in order will surely be an Employees' Thrift Club, called by whatever name might be adopted.

## Illumination in Portrait Photography.

The regular monthly meeting of the Philadelphia Section of the Illuminating Engineering Society was held on April 19, 1912, in the Assembly Room, 1000 Chestnut Street.

At the dinner preceding the meeting were 66 persons, including V. R. Lansing, L. B. Marks and Joseph Langan from New York. There were 248 members and visitors present at the meeting, which was addressed by Elias Goldensky on the "Application of Artificial Illumination to Portrait Photography."

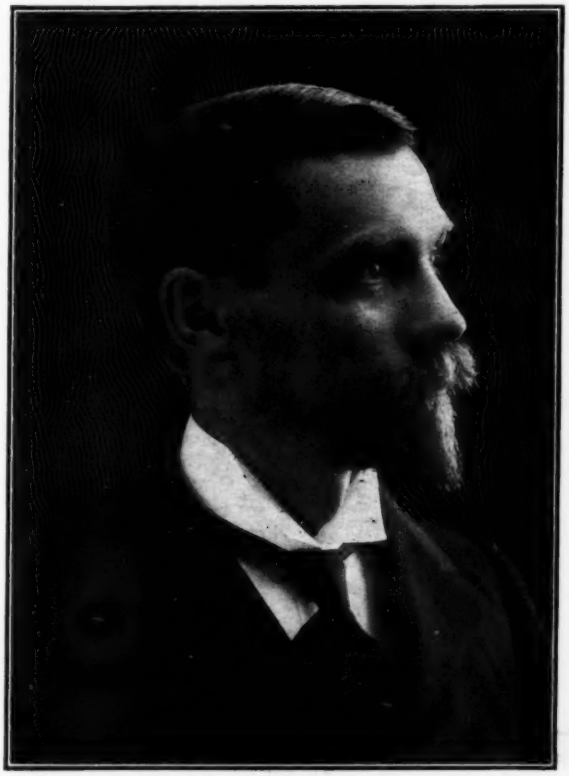
Mr. Goldensky used a variety of lamps, reflectors, shades, screens, etc., in his demonstration.

## Joseph William Richards.

The science and art of electrochemistry, unfamiliar as a practical proposition to all but a few students and laboratory workers a decade ago, are today reaching rather great proportions and attracting the attention of big interests. The success attained in the establishment of smelting and refining processes, in the production of by-products not heretofore available, and in the development of synthetic compounds having great commercial value, has indicated very clearly the possibilities of this department of electricity and chemistry combined.

One of the most ardent workers in this department of effort, and one with a distinct genius for organization and the combining of the theoretical and practical, is the subject of this sketch.

Joseph William Richards was born at Oldbury, England, July 28, 1864. He received his degree of B. A. from the Central High School of Philadelphia in 1882, and his Master's degree in 1887. He received the degree of A. C. from Lehigh University in 1886, and the degree of Master of Science in 1891. He received his Ph.D. degree in 1893. He studied at the University of Heidelberg, the Mining Academy, and Freiberg in 1897 and 1898. From 1887 to 1897 he was instructor in metallurgy and mineralogy; assistant professor from 1897 to 1902; acting professor in metallurgy in 1902 and 1903, and professor since 1903 at Lehigh University. He has also been professor of electrochemistry at the Franklin Institute, Philadelphia, since 1907. He has been called as a legal expert in chemical and metallurgical cases, was a member of the United States Assay Commission in 1897, a representative of the Franklin Institue to the International Geological Congress in Russia in 1897, a member of the Jury of Awards of the Department of Chemistry of the National Export Exposition, Philadelphia, 1899.



Joseph William Richards,
Secretary of the American Electrochemical Society.

He was one of the organizers of the American Electrochemical Society, its first president in 1902, re-elected in 1903, the only man to be thus honored up to this time. In 1907 he was elected secretary of the American Electrochemical Society, and has held this office ever since. He was president of the Chemical Section of Franklin Institute in 1897 and 1899. He is a member of the Faraday Society, Deutsche Bunsen Gesellschaft, the American Chemical Society and the Chemists Club. He is the author of "Aluminum," the only treatise on that subject in English, published in 1887. Subsequent issues have been published since that time. He is also the author of "Metallurgical Calculations"—General Metallurgy, published in 1906; part two of the same work "Iron and Steel," 1907; part three "Non-Ferrous Metals," 1908, and is the author also of many articles on metallurgy for Chandler's Encyclopaedia, and a prolific contributor to the scientific press and to the annals and proceedings of scientific societies. He is president of the Electrochemical Publishing Company of New York. He is a hard worker, a master of detail, and entitled to a very large share of the credit for whatever development electrochemistry and electrometallurgy have had in this country.

## Illuminating Engineering Society Convention.

The sixth annual convention of the Illuminating Engineering Society will be held at Niagara Falls during probably the second week of next September. Norman Macbeth is chairman of the general committee looking after the convention arrangements.

## Big Increase in Membership of the Colorado Electric Club.

About a month ago an aggressive campaign for new members was started by the Colorado Electric Club. The club was organized into the "Reds" and the "Blues," the idea being that the side securing the larger number of new members should be wined and dined as the guests of the defeated side.

Under the contest arrangements, 30 points were credited for each new member paying $5 initiation fee and $1 dues for 1912; 5 points for each 1912 delinquent member paying $1 dues, and 10 points for each 1911 delinquent member. At the close of the contest, which lasted four weeks, the membership of the club was increased from 329 in good standing to 681 members. Of this number the "Reds" turned in 158 new members, 3 two-year renewals, and 11 one-year renewals. The "Blues" turned in 148 new members, 7 two-year renewals, and 25 one-year renewals, making 4,825 and 4,635 points respectively.

The contest bristled with the spirit of friendly rivalry throughout, and added 306 new members, and 46 members who had been delinquent or dropped out since 1910, making a total increase in membership of 352. When one takes into consideration that the initiation fee was raised from $2 to $5 and $1 dues, it will be admitted that the campaign was in every way a success.

Interest in the club's affairs has been steadily maintained, and the average attendance at the weekly luncheons, which are usually addressed by distinguished speakers, has been very gratifying. In 1910 an average attendance of 93 was maintained; in 1911 it was 97; thus far this year there has been an average attendance of 125.

The greatest crowd ever gathered together was at a banquet given to Mayor Speer upon his return from Europe. More than 500 people sat down to this feast, and the club was given great credit for its success by the local newspapers.

Recently the club entertained, at one of its weekly luncheons, the members of the Engineering School of the University of Colorado. The occasion proved a record-breaker for noon-day attendance, the number present being 320.

## NATIONAL ELECTRIC LIGHT ASSOCIATION.

### Program of the Seattle Convention, June 11, 12 and 13, 1912.

The following program has been announced for the general, executive, technical, accounting, commercial, power transmission and public sessions of the Seattle convention of the National Electric Light Association, which will be held on June 11, 12 and 13. The convention will begin on the evening of June 10, with a reception and the opening of the exhibition.

Tuesday, 10 A. M.

First General Session

1—Welcome to the City; 2—Address of President Gilchrist; 3—Announcements; 4—Report of Commitee on Organization of the Industry—H. H. Scott; 5—Report of Secretary—T. C. Martin; 6—Report of Insurance Expert—W. H. Blood, Jr.; 7—Report of Committee on Progress—T. C. Martin; 8—Report of Library Committee, Report of Handbook Committee—Arthur Williams; 9—Report on Question Box—E. A. Edkins; 10—Paper: "Expanded Loyalty"—Paul Lüpke.

Tuesday, 2:30 P. M.

First Commercial Session

1—Address of Chairman of Section—H. J. Gille; 2—Address: "Commercial Development of the Electrical Industry"—W. W. Freeman; 3—Report of Committee on Membership—George Williams; 4—Report of Committee on Steam Heating—S. M. Bushnell; 5—Report of Committee on Electric Refrigeration and Ventilation—John Meyer.

Tuesday, 2:30 P. M.

First Accounting Session

1—Report of Committee on Uniform Accounting—E. J. Bowers; 2—Paper: "Incandescent Lamp Accounting of the New York Edison Company"—W. H. Bogart; 3—Paper: "Handling and Accounting for Scrap Materials"—C. E. Bowden; 4—Paper: "General Filing Systems"—R. H. Williams.

Tuesday, 2:30 P. M.

First Technical Session

1—Report of the Meter Committee—O. J. Bushnell; 2—Paper: "Meter Setting"—S. D. Sprong; 3—Report of Committee on Grounding Secondaries—W. H. Blood, Jr.; 4—Report of Lamp Committee—F. W. Smith; 4—Report of Committee on Electrical Measurements and Values—Dr. A. E. Kennelly, (to be read with Lamp Report); 5—Paper: "Line Voltage"—R. E. Campbell.

Tuesday, 8:30 P. M.

First Power Transmission Session

1—Address of Chairman—Henry L. Doherty; 2—Report: "The Use of Electricity for Irrigation and Agricultural Purposes"—C. H. Williams (Illustrated by lantern slides and motion pictures).

Tuesday, 8:30 P. M.

Second Commercial Session

1—Report of Committee on Residence Business—J. F. Becker; 2—Report of Committee on Industrial and Commercial Lighting—E. H. Beil; 3—Report of Committee on Competitive Illuminants—F. H. Golding; 4—Report of Committee on Electric Advertising and Decorative Street Lighting—W. H. Hodge.

Wednesday, 10 A. M.

Second General Session and Executive Session

1—Report of the Rate Research Committee—E. W. Lloyd; 2—Paper: "The Desirability as a Central-Station Load of Pumping for Municipally Owned Water-Works"—C. A. Munroe; 3—Paper: "Educating Central-Station Employees"—H. E. Grant. (To be discussed in Company Section meeting, Thursday, P. M.)

Executive Session (12 or 12:30)

1—Action on Report of Public Policy Committee—Arthur Williams; 2—Presentation of Proposed Constitutional Amendments—Frank W. Frueauff; 3—Report of Treasurer—G. H. Harries; 4—Election of Nominating Committee.

Wednesday, 10 A. M.

Second Technical Session

1—Report of the Committee on Terminology—W. H. Gardiner, Jr.; 2—Paper: "New Current-Consuming Devices"—F. N. Jewett; 3—Paper: "24-Hour Service in Small Central Stations"—Taliaferro Milton; 4—Report of Committee on Overhead Line Construction—Farley Osgood.

Wednesday, 10 A. M.

Second Accounting Session

1—Paper: "Proper Accounting for the Sale of Electric Devices"—L. M. Wallace; 2—Paper: "Scientific Management of an Accounting Department"—Franklyn Heydecke; 3—Paper: "Central-Station Motor Vehicle Costs and Their Distribution to Accounts Benefitted"—E. C. Scobell.

Wednesday, 2:30 P. M.

Second Power Transmission Session

1—Paper: "Work and Publications of the U. S. Government Relating to Hydroelectric Development"—J. S. Hoyt; 2—Report of Power Transmission Committee of the Association—J R. McKee; 3—Report of Committee on Power Transmission Progress—T. C. Martin; 4—Paper: "Switchboard Practice for High-Tension Power Transmission"—Stephen Q. Hayes.

Wednesday, 2:30 P. M.

Third Commercial Session

1—Report on Electric Vehicles—L. R. Wallis; 2—Report: "Electricity in Rural Districts"—J. G. Learned; 3—Paper: "A Plan for Increasing Power Load"—H. W. Cope; 4—Report: "Selling Current to Larger Power-Users"—Joseph Lukes.

Wednesday, 2:30 P. M.

Third Accounting Session

1—Paper: "Regulated Electric Light Accounting"—H. M. Edwards; 2—Paper: "Progress Made in the Uses of the Tabulating Machine"—Mr. Schmidt, Jr.

Wednesday, 8:30 P. M.

Public Policy Session

1—Musical Program; 2—Reading of Report of Public Policy Committee—Arthur Williams; 3—Report of the Medical Commission of Resuscitation from Shock—W. C. L. Eglin; 4—Lecture: Electrification of the Panama Canal (illustrated by lantern slides).

Thursday, 10 A. M.

Fourth Commercial Session

1—Report of Committee on Cost of Commercial Department Work—E. L. Callahan; 2—Report of Committee on Contract Order Routine—T. I. Jones; 3—Report of Committee on the Commercial Index—E. L. Callahan; 4—Paper; "Ozonators and Their Exploitation by the Central Station"—M. O. Troy.

Thursday, 10 A. M.

Third Technical Session

1—Report of Committee on Prime Movers—I. E. Moultrop; 2—Report of Committee on Electrical Apparatus—L. L. Elden; 3—Report of Committee on Underground Construction—W. L. Abbott; 4—Paper: "Care and Operation of Transformers"—W. M. McConahey.

Thursday, 2:30 P. M.

Third Power Transmission Session

1—Report of Committee on Receiving Apparatus for Use on Transmission Lines—F. B. H. Paine; 2—Paper: "Corona on High-Tension Lines"—G. Faccioli; 3—Report of Commitee on Protection from Lightning and Other Static Disturbances—S. D. Sprong; 4—Topical Discussions (time permitting).

Thursday, 2:30 P. M.

Third General Session and Executive Session

1—Paper: "Some Uses of Metals"—Dr. W. R. Whitney; 2—Report of the Committee on Electrical Apparatus—W. Lieb; 3—Report of the Committee on Memorials—T. C. Martin; 4—Report of the Committee on Constitutional Amendments—Frank W. Frueauff; 5—Vote on Constitutional Amendments; 6—Report of Nominating Committee; 7—Election of Officers; 8—Adjournment.

Thursday, 3 P. M.

Company Sections Session

1—Report of Committee on Award of Doherty Gold Medal—W. W. Freeman; 2—Discussion of Grant Paper; 3—The Proposed Company Section Lecture Bureau—T. C. Martin; 4—Experience Meeting as to Company Section Work.

# Electrical Refrigeration for Florists.

By R. L. Lloyd.

Heat is life; and the progress of every living cell is toward change and decay. If, then, heat can be withdrawn or withheld from a living body, the processes of life and decay are retarded or stopped. Plant life progresses up to the period of full blosson and then immediately the flowers begin to wither and fade. The business of the florists has grown to immense proportions and amongst the equipment of the modern shops of wholesaler and retailer is found the refrigerating machine. Lily bulbs and others of a similar nature are preserved in cold storage, so that they may be made to grow and develop at the desired time. Moreover experiment demonstrates that bulbs so stored have greater vitality than was usual under ordinary storing where the temperatures fluctuated up and down with the normal winter weather conditions. Growing plants have the surrounding temperature carefully regulated so that their activity is reserved, until just the proper time for the blossoms to be marketed, when the greatest demand occurs. Cut flowers, gathered in their prime, are put in cold-storage rooms and further development arrested until their immediate disposal is accomplished.

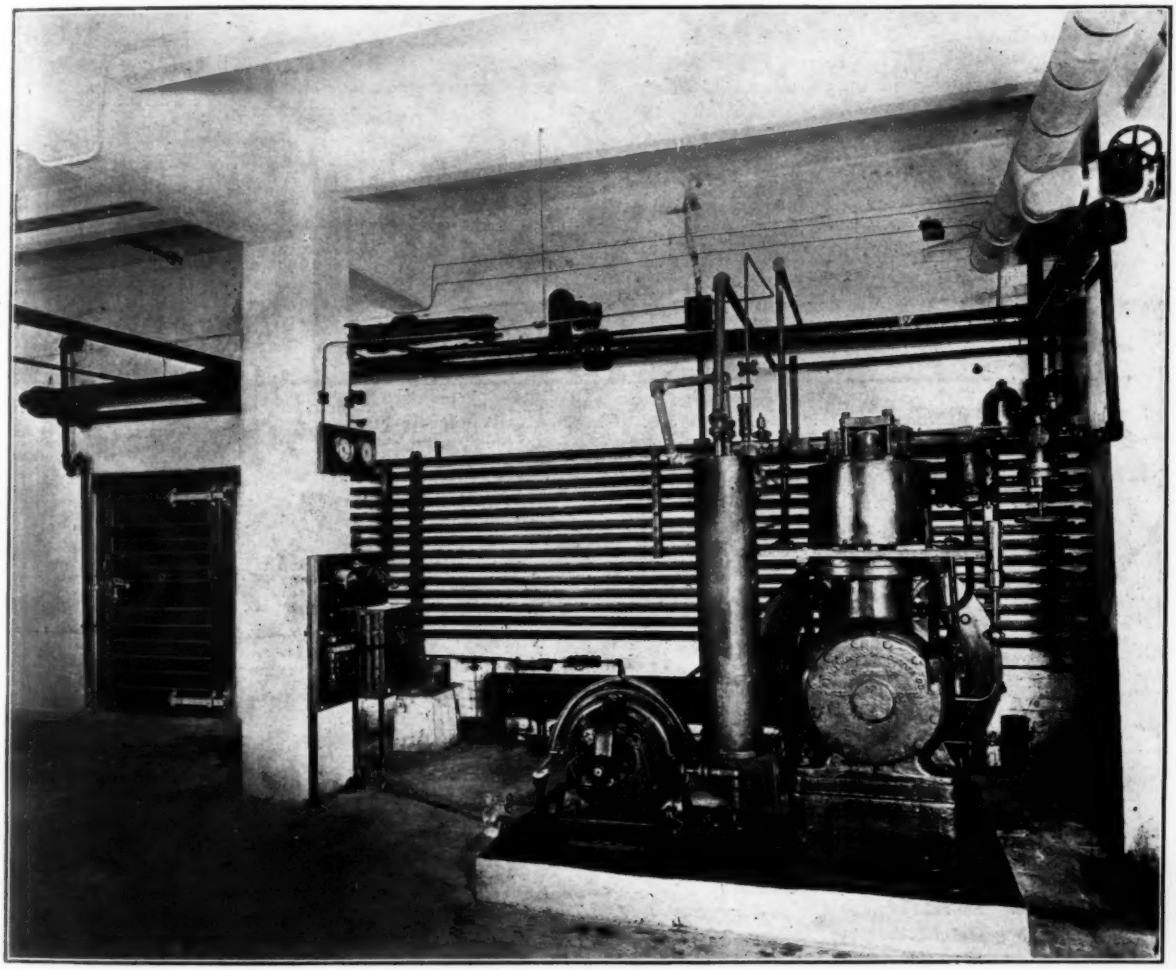


Fig. 1.—Six-Ton Refrigerating Machine.—Door to Refrigerator at Left.

It is to this latter class that the larger number of refrigerating machines in use by florists belongs. Flowers are gathered in immense quantities in the surrounding territory, and shipped to the wholesalers in the large cities. Here they are placed in refrigerators until sold. The blossoms retain all their pristine beauty and aroma in a temperature a few degrees above freezing and reach the consumer in much better condition than would otherwise be possible.

One such wholesaler is equipped with five cold-storage rooms. Three of them are built together with communicating doors, so that it amounts to one refrigerator divided into three compartments. Only one opens to the outside. This is maintained at 44 to 54 degrees Fahrenheit. The inner rooms are kept at about 40 or 42 degrees. The fourth box is the freezer. It is located in the basement directly under the other rooms, and is used for smilax and green stuff. The temperature here is always maintained below 32 degrees. The fifth room is used as a sort of vestibule for the freezer which opens into it only, and very little storage is done here. Temperature 45 to 50 degrees.

The walls of all these boxes are one foot thick, containing nonpareil cork

## Data Sheet: Refrigeration for Florists.

**The term load-factor is used in such a sense that a load-factor of 100 per cent represents the use for 24 hours every day of power corresponding to the rated capacity of the motors connected.**

**Wholesale Florist.**

Room 1: 14 by 22 by 12 feet, making 3,696 cubic feet. One three-foot door, with glass windows, opened to the store, fifty times per hour during morning, less frequently balance of day; one door to inner box No. 2; two electric lamps, constantly burning; 200 feet of two inch ammonia piping; brine storage tank; temperature 44 to 54 degrees.

Room 2: 12 by 23 by 14 feet, making 3,864 cubic feet. One 3-by-3-inch door near ceiling opens to outdoors for use in cold weather; one door into Room No. 1, usually closed; one door into room No. 3, usually open. Two electric lamps burning nearly all day; 200 feet of 3-inch ammonia piping; brine tank; temperature about 42 degrees.

Room 3: 12 by 25 by 14 feet, making 4,200 cubic feet. One door opening into box No. 2. Window 3 by 4 feet opening on street for light, four thicknesses of glass; 200 feet of three-inch ammonia-expansion pipe; brine tank 3 by 18 feet by 1 foot, holding 380 gallons of calcium brine for storage purposes; temperature, 42 degrees.

A six-ton Remington vertical, single-acting refrigerating machine is used for these boxes. It is driven by a 12-horsepower 250-volt, direct-current motor by means of a silent chain, ratio 6.4 to 1. The speed of the motor is 700 revolutions per minute. The actual input to the motor when running at maximum speed was 9.07 horsepower under a head pressure of 120 pounds, and a back pressure of 10 pounds per square inch.

The actual kilowatt-hour consumption for two years is as follows: January, 787; February, 805; March, 1166; April, 1973; May, 2087; June, 2549; July, 2603; August, 1978; September, 1329; October, 1028; November, 704; December, 412; January, 449; February, 462; March, 441; April, 680; May, 1064; June, 1669; July, 2406; August, 2240; September, 2208; October, 1887; November, 1596; December, 1141. Average per year, 16,832.

Load-factor, 22.0 and 20.6 per cent.

Kilowatt-hours per year per cubic foot, 1.02 and 0.955 per cent.

**The Leo Niessen Company, 1201 Race Street, Philadelphia, Pa. Wholesale Florist.**

Six-ton Remington vertical, single-acting refrigerating machine, chain-driven at 600 revolutions per minute by 12-horsepower, 220-volt, direct-current motor. Two rooms are cooled, combined capacity, 6,080 cubic feet. Direct expansion pipes and brine tank used. Power required, 7 kilowatts.

The kilowatt-hour consumption for two years is as follows: January, 677; February, 606; March, 690; April, 871; May, 966; June, 1039; July, 1036; August, 969; September, 887; October, 946; November, 903; December, 761; January, 905; February, 965; March, 1036; April, 1512; May, 1529; June, 1836; July, 1879; August, 1565; September, 1362; October, 1627; November, 1196; December, 850.

Average kilowatt-hours per year, 13,306.

Load-factor, 13.1 and 20.6 per cent.

Kilowatt-hours per year per cubic foot, 1.70 and 2.67.

**Pennock Brothers, Philadelphia, Pa. Retail Florists.**

Display case, 16.5 by 3.5 by 9 feet.

One-ton Brunswick refrigerating machine belted to 3-horsepower direct-current motor, running at 1650 revolutions per minute. Power required, 2 kilowatts.

Kilowatt-hours per month for three years are as follows:

| | 1909 | 1910 | 1911 |
|---|---|---|---|
| January | 280 | 310 | 265 |
| February | 283 | 338 | 268 |
| March | 300 | 370 | 262 |
| April | 315 | 417 | 264 |
| May | 420 | 435 | 313 |
| June | 486 | 569 | 442 |
| July | 560 | 595 | 470 |
| August | 608 | 530 | 515 |
| September | 590 | 450 | 460 |
| October | 518 | 395 | 416 |
| November | 477 | 319 | 354 |
| December | 420 | 277 | 283 |
| Total | 5257 | 5005 | 4312 |
| Load-factor in per cent | 26.6 | 25.4 | 21.9 |
| Kilowatt-hours per cubic foot, per year | 10.1 | 9.6 | 8.3 |

and covered with cement. The freezer is in size 12 by 25 feet and 10 feet high. It contains 200 feet of three-inch pipe for direct ammonia expansion, with a brine-storage tank, 3 feet wide, 19 feet long and one foot deep. This body of brine is cooled to about 15 degrees and helps to maintain the low temperature over nights and Sundays when the machine is not operating. The vestibule room is also 12 by 25 feet, but the floor is not so deep—walls 7.5 feet high. It is similarly equipped with coils and brine tank. Each room has its cooling pipes separately controlled by stop valves so that the desired temperature can be obtained independently of any other box.

The full speed of the motor which operates the refrigerating machine is 700 revolutions per minute. It is equipped with a Cutler-Hammer speed controller with ten points, giving speeds ranging down to 340 revolutions per minute. When first installed a slow speed was generally used, but inasmuch as this resulted in considerable loss of efficiency and longer hours of operation, this practice was discontinued and the motor operated at the highest speed.

Another wholesale florist was equipped with the same kind and size of refrigerating machine, chain-driven at 600 revolutions per minute by a 12-horsepower, 220-volt, direct-current motor.

They had two refrigerator boxes, one in the store and one in the basement. The first was 40 by 10 feet and 12 feet high, had two exits and was lighted by two 32-candlepower electric lamps. All the piping is arranged overhead in and around two brine tanks each containing 300 gallons of calcium brine.

In order to avoid too pronounced cooling of the flowers near the top of the racks, an arrangement of flues was built into this box by which the cooled air is conducted down the side walls to within two feet of the floor.

It then spreads over the full area and rises gradually to and through an opening in the middle of the false ceiling. An equable temperature is thus obtained and very excellent results are secured. (See Fig. 3.) The doors are opened every few minutes throughout the day and the lamps are burning practically all the time from 7 a. m. to 7 or 8 p. m.

The refrigerator room in the basement is maintained below the freezing point for the storage of ferns, smilax, etc. It is 20 by 8 by 8 feet. It is equipped with direct-expansion pipes on the side walls and auxiliary brine tank the length of the room, but shallow. One hour's operation of the machine will reduce the temperature of the box ten or fifteen degrees. The door is seldom opened and a low temperature is easily maintained. The input to the motor equals 6.96 kilowatts.

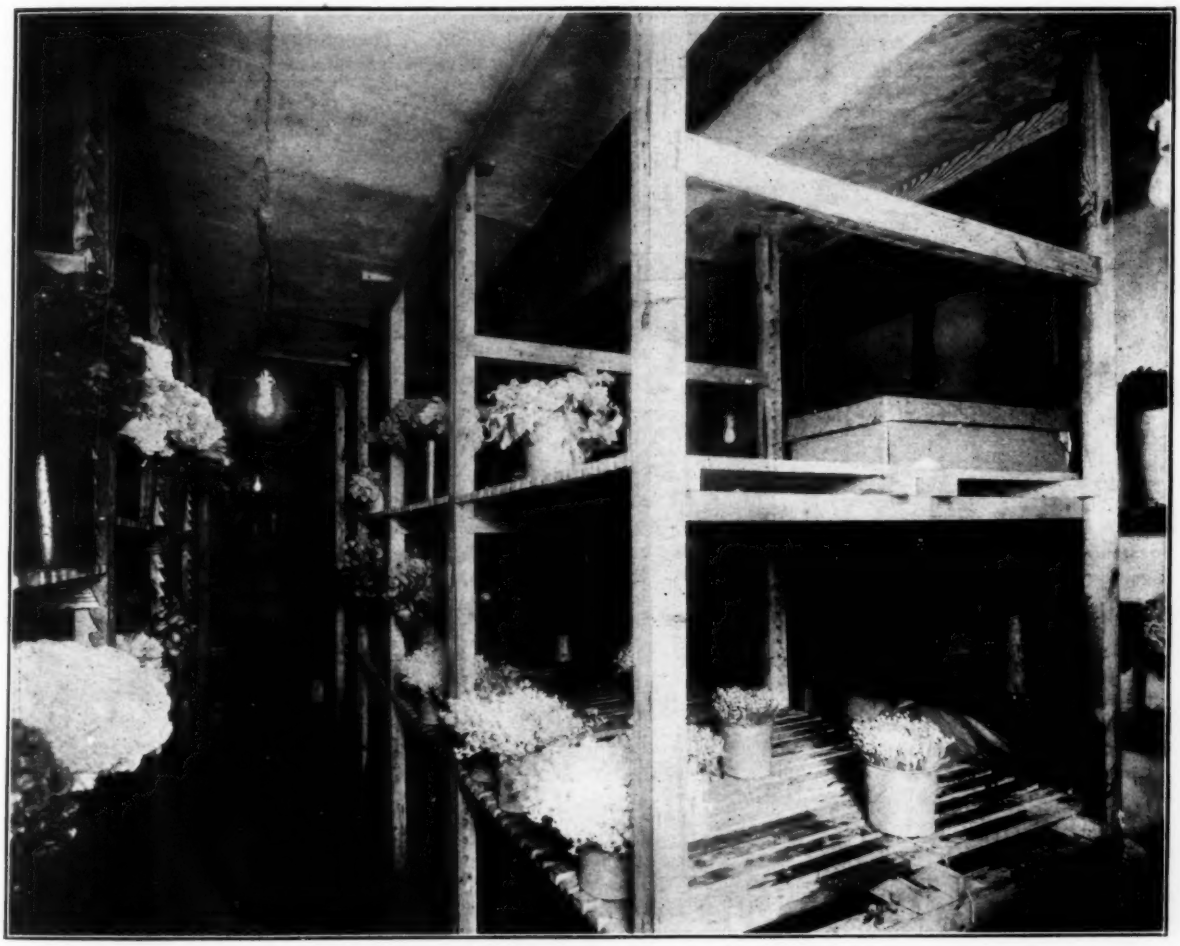


Fig. 2.—Refrigerated Room in Florist's Store.

With the retail florist, the demands for refrigeration are much less extensive, but on account of the display of much of the stock in glass cases or show windows, the conditions under which the low temperature must be maintained are difficult and frequently far from the idea, that is, from the refrigerating engineer's standpoint. A case in point is the establishment of Pennock Brothers in Philadelphia. They have a handsome display case 16.5 feet by 42 inches by 9 feet high,

situated along the wall of a warm store. The lower part contains three large drawers, each about 15 inches deep. Above this is the display case with sliding glass doors. The upper portion, which was formerly an ice bunker, now contains the cooling coils and brine tanks. On account of the appearance and light reflections double panes of glass cannot be used, in the show case, a single thickness of beveled plate glass being the only insulating medium in front. Four sliding doors give access to the three shelves of cut flowers within. The flowers stand in water in jars and cases, and this water is renewed each morning. They are about 40 in number and contain over 30 gallons of water which in summer is quite warm when drawn from the supply. This, of course, all must be cooled to the desired temperature of the case, which is usually about 44 or 45 degrees.

To maintain this temperature the top section contains four brine tanks each 14.75 feet long, 1.5 feet deep, and 4 inches wide, containing weak calcium brine. Immersed in the brine is the ammonia cooling piping, one inch diameter, and 400 feet long. The brine is frozen solid at about 26 degrees Fahrenheit and acts as any other cake of ice in keeping the case cool over nights and Sundays. The cold air circulates by gravity, the bottom of the show-case section being perforated to allow the coldest air to reach the smilax in the drawers. Four electric lights burn inside the case.

The case is filled each morning with fresh water and flowers from the hothouse, and the doors and windows are opened frequently, permitting the temperature to rise 20 to 25 degrees above the standard temperature maintained. It is soon lowered, however, when the doors are kept closed.

The refrigerating machine is installed in the basement. It is a one-ton Brunswick, upright, single-acting compressor, and is driven by a three-horsepower Peerless, direct-current motor, running at 1,650 revolutions per minute, by means of a belt. The input to this motor is two kilowatts. It operates from six to ten hours daily.

Ice was formerly used to cool this showcase, but the annoyance and disfigurement of the carved woodwork was such as to make some other method preferable, even if at increased expense. Ice cost $500 per year. The electric-power cost last year was a little over half this amount. The temperature obtained is five to ten degrees lower and the satisfaction cannot be measured in dollars. These statements will be found of universal application in this business.

## Chicago Street Lighting.

At the luncheon meeting of the Electric Club of Chicago, on Thursday, April 25, the speaker of the day was Louis Friedmann, of the General Electric Company. Mr. Friedmann described the new flame-arc lamps which will be installed for the street lighting of the city of Chicago. He sketched the developments which led up to the adoption of the flame-arc type, and described the various characteristics affecting both the mechanical and electrical performance of the lamps.

George J. Keech, of the Cooper-Hewitt Electric Company, read a communication from Louis Bell, relating to the height of suspension for such lamps, describing some recent foreign practice, and also outlining the experience and City of Boston has had with a very successful installation of lamps of a similar type.

John F. Gilchrist, president of the National Electric Light Association, warmly endorsed the idea of club meetings such as the Electric Club was holding, and pointed out the great number of similar organizations that were emulating the Electric Club example in the principal cities all over the country. He thought it an excellent thing for men in every department of the electrical industry to attend these meetings and get to know each other better and take a greater interest in each other's work and welfare. He also called attention to the great convention which the National Electric Light Association will hold at Seattle, June 10 to 14, and urged that all those who could should make a sacrifice to attend this important gathering of electrical men.

Walter Anthony, of the Sanitary District of Chicago, spoke briefly, intimating his great pleasure at meeting so many electrical men, and endorsed very strongly the club idea.

Fig. 3.—Show Case in Store of Pennock Brothers.

## Program of Mississippi Convention.

The fourth annual convention of the Mississippi Electric Association will be held at Vicksburg, Miss., May 28, 29 and 30. The following papers will be presented: "Review of the Development and Present Types of Induction Meters," by R. C. Lanphier; "Grounding of Secondaries," by J. T. Robertson; "Transformers and Induction Regulators," by G. E. Allen; "Modern Car Construction for Small Cities; "Rates for Electric Service," by G. S. Merrill; "Mixed and Low-Pressure Turbines up to 750 Kilowatts," by R. E. Bussey; "Coal—Hand-Fired and Mechanically Fired," by W. F. Corenflo.

The first session will be on Tuesday morning and will include a welcome from J. J. Hayes, the Mayor of Vicksburg, and the President's address by Jack Abbott. On Tuesday evening there will be a reception. On Wednesday evening there will be a public address by George H. Harries, treasurer of the National Electric Light Association, to be followed by a rejuvenation of the Sons of Jove. On Thursday evening there will be a banquet. Sight-seeing trips will be taken through the Vicksburg National Military Park and Cemetery on Tuesday and Wednesday afternoons.

# Commercial Practice
# Management, Rates, New Business

## THE EFFECT OF CENTRAL-STATION RATES ON NEW BUSINESS.

By H. S. Sines.

One of the principal functions of central-station management is the increasing of business, and recently there has been a great deal of discussion of various methods for accomplishing this result. There have been tried various methods, such as campaigns for house wiring, flatirons and heating appliances, washing machines, vacuum cleaners, refrigerating machines and others of a like nature, with all of which you are, of course, familiar.

All of these have been productive of very pleasing results, but there are many possibilities which are not covered by any of the above methods. What is desired is the kind of new business which will utilize more of the equipment during the off-peak hours. All equipment and lines should as far as possible be in use all hours of the day and night, in order to bring returns commensurate with the investment. Interest and similar charges go on every hour in the year, and, therefore, business should be secured that will enable the investment to be earning revenue as many hours in the year as possible. There are several classes of business which, although not obtainable with present systems could, if proper rates were offered, be readily secured at a profit and make your equipment earn revenue during more hours in the year. Among these might be mentioned private plants, consisting of: hotels with their load composed of lighting, elevators, laundries, refrigerating machines, kitchen utensils, vacuum cleaners, flatirons, curling irons, etc.; department or general stores with their large installations of lights running a great many hours of the day, elevators in continuous service, ventilators and carrier systems operating all day long, and in some cases the charging of electric delivery wagons during the off-peak interval; manufacturing plants with motor loads coming on at the time of day when the lighting load on the central station is least, their lights burning usually all day, but shut off just before the peak of the residence-lighting load comes on; electrical-vehicle charging, both in public and private garages; and innumerable miscellaneous possibilities, such as ice-making plants, cold-storage plants, hoists, concrete mixers and air compressors in building-construction work, grain elevators, and electric railways.

In order to illustrate these possibilities, there are shown herewith load curves of several different customers in the month of January which will hereafter, for convenience, be referred to as power customers, although some of these also use considerable light. There is also another curve showing the resultant power load on the central station, the latter being the maximum load on such central station in that month. It is to be noted that the total maximum load on the station in January was 972 kilowatts (Fig. 4) from 9:30 to 10:00 a. m., and also that the sum of the maximum demands of these power customers was 1,119 kilowatts. In other words, if the maximum demands of these consumers had all occurred at the same hour, the maximum power demand on the station would have been 147 kilowatts (or 15 per cent) higher than it actually was. This means that because of the diversity factor on that particular day between these consumers the central station was able to carry 1,119 kilowatts of business with 972 kilowatts of generating equipment, or a diversity factor for that day of 1.15.

Let us consider the load curves from these consumers separately. Fig. 1 is a particular department store in which the peak occurred from 5:00 p. m. to 5:30 p. m., it being principally a day load. A small amount of energy, however, is taken during the night.

The next curve, Fig. 2, shows the consumption of a Government post-office building in which a great deal of work, such as handling of mail, is done at night, and current is used during the late evening and early morning hours when the station load is lightest. Consequently the load-factor is excellent. The peak occurs from 3:30 to 4:00 in the afternoon, falling off as the station load increases.

Fig. 3 shows the conditions existing in a newspaper plant. This class of load is extremely desirable on account of continued use during the time of light demands on the station and abrupt falling off at the station peak.

Consider similar load curves, obtained from the same territory, of a hotel; two grain elevators; machine shop; steel foundry; and piano factory, having maximum demands of 75, 46, 72, 160, 233 and 173 kilowatts, respectively. These six, together with those shown, refer only to the diversity factor occurring between the demands of these nine consumers on one single day. There will be an additional diversity between the various days in that month, because the maximum demand of these nine consumers will fall on different days in the week and in the month. The department-store maximum will usually fall on Monday and vary between the first and last Mondays in the month. The hotel maximum will usually occur on Saturday and it is likely to be almost any Saturday in the month. The newspaper maximum will usually occur on Saturday and is also likely to be on almost any Saturday in the month. The post-office maximum will probably always occur on Monday, on account of the two days incoming mail to be handled and distributed, and it will be the first Monday in the month due to the mailing of statements and periodicals. The maxima on the grain elevators is likely to occur on any day in the week except Saturday and at any time during the month. The maximum on the piano factory is also not likely to occur on Saturday on account of earlier closing, and this maximum may occur at various times in different months. The foundry and machine shop maxima will also not occur on Saturday for the same reason, and these may occur at various times during different months. Therefore, the sum of the maximum demands of these nine consumers in January would be considerably greater than 1,119 kilowatts, but which would still be supplied by 972 kilowatts of generating capacity shown in Fig. 4.

Furthermore, there will, of course, be a very large diversity between the combined load of these nine power consumers and the lighting load including street lighting in such a city. This is illustrated in Fig. 5, which shows the before-mentioned power load, also the winter lighting load, and a combination of the two. The lighting load has a maximum of 2,800 kilowatts from 6:00 to 6:30 p. m., and the

power, as before, of 972 kilowatts from 9:30 to 10:00 a. m. The peak of the combination of the two loads is 3,200 kilowatts. The diversity, therefore, is 2,800 plus 972 divided by 3,200, or 1.17. The final and greatest benefit of all this diversity is the improvement in load-factor, which in this case for an average winter day is brought up to 60.2 per cent. Similarly the load-factor when combined with the same lighting load for an average day in July is brought up to 64.5 per cent. This means that the average load in a 24-hour day in July was 64.5 per cent of the maximum load on the same 24-hour day. The yearly load-factor is of course less, due to the higher lighting peak in winter and the shutting down of large amounts of power and business lighting on Sundays and holidays.

The "off-peak" method consists of selling electrical energy with the definite stipulation that the energy be not used during the hours of the annual lighting peak, the peak being for example, from four o'clock p. m. to nine o'clock p. m., during November, December, January and February. The off-peak method may be regulated by the use of instruments that will give a record on paper of the amount of energy used during every hour of the day or night.

The reasons for the use of the demand system are apparent, when it is considered that electrical energy cannot be sold to long-hour users and to short-hour users at the same rate because electrical energy cannot be stored in large quantities except at a great expense, but must be manufactured for instant use as the demand necessitates. Furthermore a one-hour user and a ten-hour (both having the same maximum demand at the same time) require equal amounts of central-station investment to supply them, but the latter consumes ten times the number of kilowatt-hours and is fairly entitled to a much lower average rate per kilowatt-hour, and conversely the former must pay a very much higher average rate to prevent a serious loss to the central-station company. For these reasons it is necessary for the central-station company to provide generating and distributing equipments to handle the maximum demand or peak load, and since the peak load lasts usually for only a very small fraction of the total year, the central station is operated for the greater part of the year at a production much below its capacity. The large part of the central-station expenses, however, remains practically the same, such as interest, taxes and depreciation on the generating and distributing investment, and these are termed the "fixed charges." The "variable charges," which are proportional to the quantity of energy being generated, such as fuel, water, labor and supplies, constitute much the smaller portion of the total cost. For this reason the central-station company can sell electrical energy at a lower average rate per kilowatt-hour to customers using it for a good many hours per day or year, than it can to customers using it for only a few hours per day or year.

The reasons for the use of the off-peak method are also apparent, when it is considered that a large portion of the central-station investment is necessary solely to serve the annual peak load, and if it is possible by the means of a lower rate for off-peak business, to utilize this machinery during portions of the day or year when it is

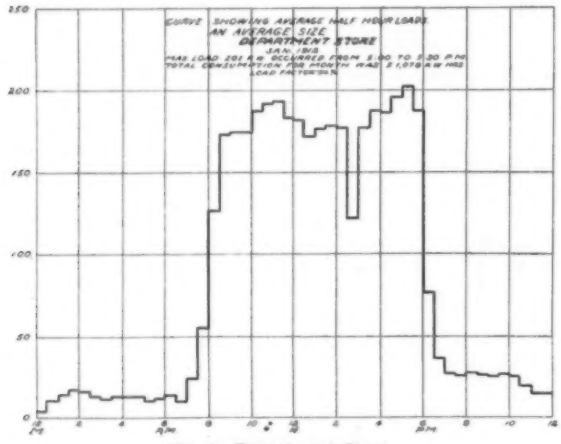



Fig. 1—Department Store.

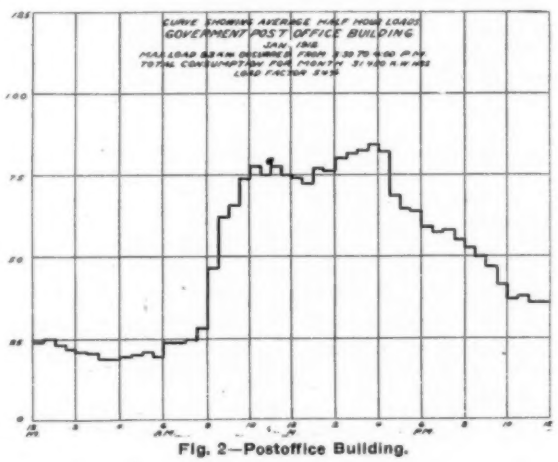



Fig. 2—Postoffice Building.

It is believed, and in fact it has been proven, that the adoption of a schedule of rates on the co-called "cost to serve" basis will be the means of securing not only profitable customers of the classes mentioned, but by popularizing the use of electricity, will tend to increase the amount of residence consumption. This so-called "cost to serve" sytem of charging may be applied by at least two general methods, the "demand method" and the "off-peak" method.

The demand method consists of a primary charge to cover interest and other fixed expenses and a secondary charge to cover the variable expenses. The primary charge is represented by the highest amount of energy consumed during a 30-minute interval (this length of interval having practically become standard), a record of which energy is obtained by the use of maximum-demand measuring devices attached to the watt-hour meter. The secondary charge is represented by the total kilowatt-hour consumption during the month, based on the total reading of the watt-hour meter at the end of the month.

The demand system of charging will enable the central station, with profit to itself, to quote a rate which will be very attractive to the classes of business which it is intended to obtain by the use of this system. And this is necessary, since many modern private plants may generate their own electricity at a cost almost equal to that which central stations can afford to offer when using a flat meter rate without taking diversity-factor and load-factor into consideration. However, the central station may, by obtaining a number of these users, create a good load-factor and diversity-factor and to such users it can afford to sell energy cheaper than the private plant can possibly manufacture it and the central station can still make a reasonable and usually a very good profit.

There are certain classes that would use large quantities of energy, but who cannot afford to pay the rate which idle, it is certainly advisable to make a standard off-peak rate which will give a reasonable profit over the manufacturing expenses for the energy sold.

must necessarily be charged for customers whose load comes during the annual peak of the station load, but who would be glad to use central-station service if available and to use it only during the off-peak hours or perhaps only during the summer months. Among these would be ice-making, ice-cream manufacture, summer amusement parks, electric-vehicle charging, electric furnaces, and electric pumping of water. The central station could in turn afford to make a lower rate for this class of users, with the stipulation that if such customers use this energy during the peak, they pay for it at a higher rate. This would also greatly improve the central-station load-factor and make it possible to obtain a greater return for a given investment.

There may arise questions as to the best methods for handling this business, that is, from the metering standpoint. In connection with the demand system advocated it has in some cases been the practice, and for reasons that until lately have been real, to estimate the demand. This has been accomplished in several different ways, but frequently based on connected load. In that case the central station must depend upon the integrity of the customer or make frequent inspections and tests to make sure that the customer has not added to his lighting or power equipment, and in some cases make investigations as to the truth of the name-plate rating of the motors or other current consuming apparatus. Such inspections and investigations will always tend to make the customer dissatisfied on account of his belief that he is suspected of dishonesty. Other bases used have been floor area, cubical contents, or other arbitrary factors. The customer naturally prefers, and in fairness should pay on the maximum demand he actually takes and not on what it is estimated he will take according to some arbitrary rule.

This practice of estimating the maximum demand is always bound to introduce errors that will either cause a serious loss to the central station on account of too low an estimate, or if the estimate is too high the customer's bills will be excessive and cause a consequent loss of business. The necessity for the use of these crude methods has been largely on account of unsatisfactory instruments for properly measuring the maximum and at a cost that could be afforded with the smaller customers having a load of less than 50 horsepower. This, however, no longer applies, since less expensive instruments have now been developed. Devices have also been developed that will give a permanent printed record on paper of the customer's consumption at all times, that is, something that will show the amount of current he is using and when he uses it. This will permit a low charge for the "off-peak" use and should he desire to avail himself of energy during the peak the amount he uses is shown and he can be charged for it at a higher rate. This arrangement works out to the satisfaction of both the customer and the central station.

It is important to note that the greater the diversity of the consumers supplied, the better the load-factor on the station. In other words, in supplying the nine consumers referred to, some have a rather poor load-factor, yet when all are combined as shown in Fig. 4, the result will be a very good load-factor.

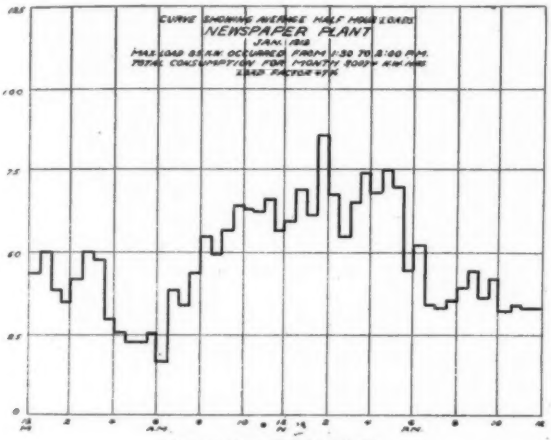



Fig. 3—Newspaper Plant.

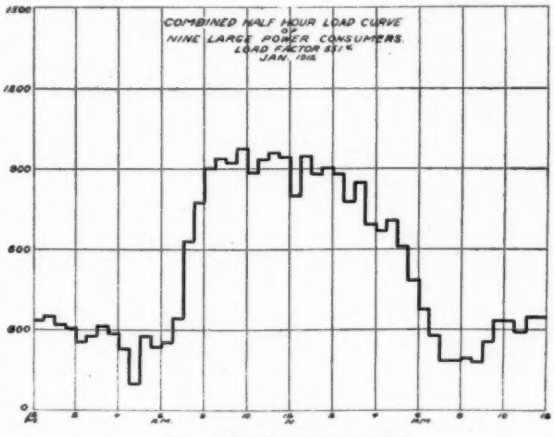



Fig. 4—Combined Load Curve.

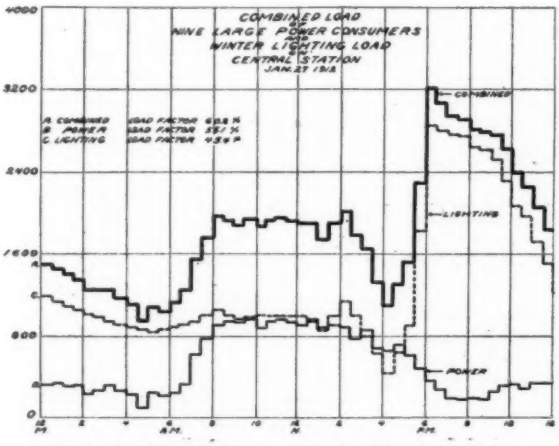



Fig. 5—Combined Power and Winter Lighting Load.

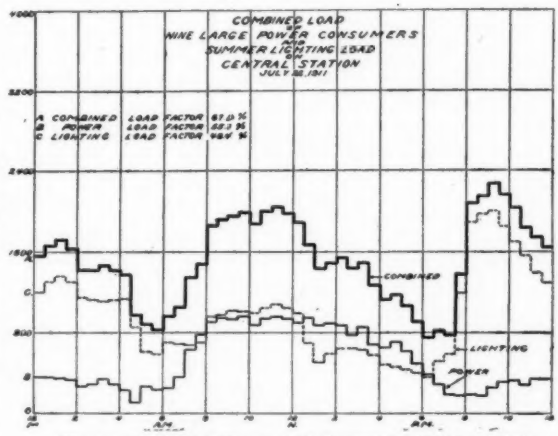



Fig. 6—Combined Power and Summer Lighting Load.

# Electrical Construction

## ELECTRIC WIRING FOR LAMPS IN SUMMER GARDENS.

By H. G. Wilson.

Outdoor lighting with electric incandescent lamps has become so common now that it is rather suprising that wiremen are not more generally familiar with what constitutes really high-class wiring for lighting of this sort. Of course, so far as the lighting of streets with incandescent lamps is concerned, the writer has no criticism of the wiring as it is usually done to offer; but when it comes to such jobs as the wiring for lights in gardens used as outdoor dining rooms and the like, there is a rather general lack of good installations. Often the wireman undertaking to put work of this kind in has no very definite ideas as to how to proceed, and, what is worse, the man furnishing the money for the work usually wants it done as cheaply as possible. It is seldom, therefore, that a substantial, permanent job is done. The installation described in the following notes, however, constitutes an interesting exception to this condition. It is therefore deemed of sufficient importance to be described at some length here.

This installation has been in use for several years, exposed to all sorts of weather, and the only repairs required during this time has been the renewal of some galvanized iron wire which rust had rendered insecure. The general condition of the work shows it to be worthy of imitation.

The garden, or park, lighted is about 175 feet by 200 feet in size, and is surrounded by covered walks about 10 feet wide, which are connected across the garden by a covered archway (indicated by dotted lines in the illustration). The walk across the garden is outlined by border lights wired in conduit and conduit fittings, and is surmounted by four inclosed arc lamps on top of the middle of the arch (See figure), also wired in conduit.

Conduit is used in the rest of the garden wherever possible. It is used for the border lights on the band shell, the lights on the main entrance, and for those along the sidewalks. For wiring through space a strong suspension method is employed.

In the circuits run as open work No. 14 rubber-covered wires are separated two and one-half inches every four and one-half feet by porcelain cleats, the two halves of which are held in place by stove bolts. A drop light of No. 14 rubber-covered stranded wire with a porcelain weatherproof socket is suspended at each cleat, the cleat being used as an anchor for the joints by making the tap on the opposite side of the cleat to that which the lamp hangs from and running the drop cord through the cleat with the circuit wires. All splices are carefully waterproofed with an insulation compound.

Each two rows of 12 lights running parallel with the length of the park are spaced 10 feet apart. These rows are held in suspension by tie wires

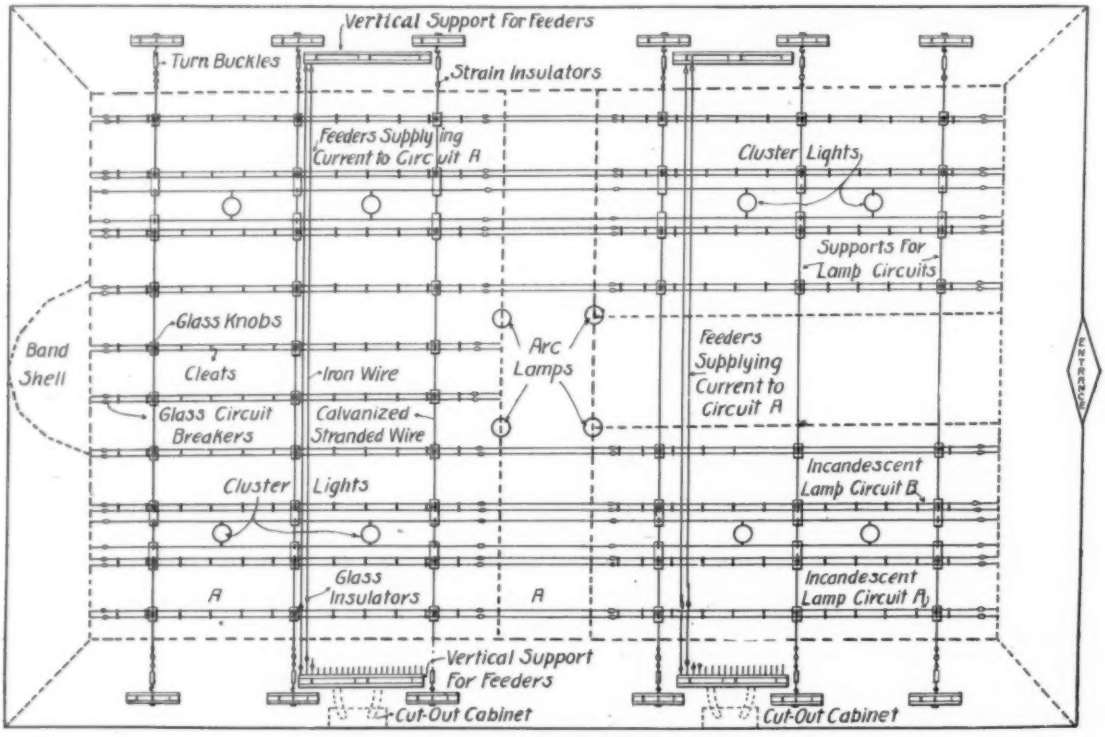



**Diagram Indicating Circuits and Supports for These.**

to glass knobs strung on stranded steel, galvanized wires stretched across the park every 10 feet. The stranded wires are securely anchored at each end to structures built up of 2-by-4-inch timbers, on top of the covered sidewalks. Strain insulators and turnbuckles are employed between the supporting timbers and the main length of the stranded wire. Thus it is made impossible for a lamp circuit to become grounded through one of these supporting cables; and, also, by means of the turnbuckles, any undesirable sag in the supports may be taken up at will.

The accompanying figure shows the open-wiring lamp circuits running parallel with the length of the garden and the supporting, stranded-steel wires extending across the garden at right angles to these circuits. Two of the feeder circuits are likewise shown.

The feed wires are stretched 14 feet above the circuit wires. They are fastened through glass circuit-breakers to frames built up of 2-by-4-inch timbers. When a given feeder has reached the circuit to which it is to supply current, it is terminated there in another glass circuit-breaker, from which latter a galvanized iron wire is run to the supporting frame on the opposite side of the garden. In the diagram, two feeders both supplying current to one lighting circuit, are shown. For the sake of clearness the rest of the feed wires are omitted from the figure.

The outside ends of the circuit wires are attached to the walls which surround the park by means of galvanized iron wire through glass circuit-breakers. This affords a strong support every ten feet.

Four ornamental iron lamp posts holding clusters of five lamps each are spaced symmetrically in each half of the park. They are fed from the suspension system also.

Each circuit of twelve lights is controlled by a snap switch placed on a slate panel in a steel cutout cabinet under the covered walk, one cabinet being used for each half of the park.

It is understood, of course, that the overhead network of wires described above might possibly be objectionable where there are no trees. In the case, under consideration, however, the foliage renders the wires nearly invisible. The installation is certainly a decided success both from the standpoint of good electrical construction and that of effective lighting.

Of course, the use of porcelain cleats for outside work is a violation of Code rules, but they were the only material on the market which could be used in this installation.

## Practical Points on Knife Switches.

All knife switches made by reputable manufacturers are constructed in accordance with National Electrical Code requirements. This protects the buyer against very serious deficiencies, but it is advisable to inspect every switch carefully before it is installed, in order to avoid small annoyances.

Fig. 1 gives the names of knife-switch parts. The contacts between the break-jaws and the blades should be carefully inspected, as it is at these points that knife switches are most apt to give trouble by overheating.

The contact between the hinge-jaw and the blade seldom affects the capacity of a switch, because it is under pressure from the hinge bolt and spring washers. The capacity of a switch is determined by its temperature rise. The Code specifies a maximum rise in any part of 50 degrees Fahrenheit at full load.

Considerable skill is required to effect a good contact or "fit" between break-jaws and blades. After a switch is assembled, the jaws are first bent into correct position either by hand or by

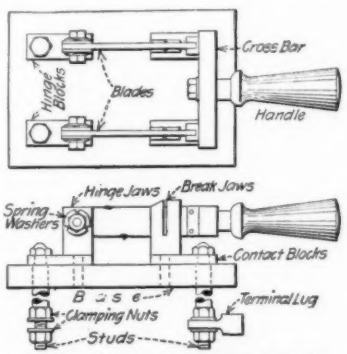



**Fig. 1.—Names of Parts of Switch.**

driving a block of wood against the distorted portion with a hammer. Then they are "ground in" with vaseline and fine (FF) pumice stone.

Often the fit of a switch is reasonably good at the start, and merely working the blade in and out of the jaws by hand will grind it in. Before the grinding process is started, the portion of the blade that wipes the jaws should be daubed with the vaseline and pumice-stone compound. The abrasive not only grinds the contact to a fit but wears off the lacquer, which, if it remained, might cause bad electrical contact. The surplus compound should be removed with a rag.

A test for good blade contact can be made by trying to insert a "feeler," which is a leaf of very thin steel, mica or paper, between the jaws and blade at the corners and edges. About 0.001 to 0.004 inches is the right thickness for a feeler. An excellent feeler can be made by hammering down to a knife edge the edges of a strip of very thin metal possibly four inches long and three-quarters of an inch wide. If the feeler slips in at any point, it is evident that the fit is poor at that point, and the contact bad. Proper forming of the jaw will correct the difficulty. There have been cases where switches have been made to carry, without excessive temperature rise, currents 50 per cent greater than their normal ratings by merely fitting the jaws accurately to their blades.

About 1,000 ameperes per square inch of copper cross-section and 50 to 75 amperes per square inch of sliding contact surface are usually allowed in designing switches. A switch that will carry 1,000 amperes with 20 degrees temperature rise will carry probably 2,000 amperes with about a 60-degree rise. The radiation of heat from the switch increases more rapidly than does the rise in temperature, and as the heat generated varies as the square of the current, it is evident that the temperature rise will be somewhat less than proportional to the square of the current.

A switch will break about twice the voltage with alternating current that it will with direct current, the amperage being the same in both cases. The Code recognizes this and specifies that "for 100-ampere switches and larger, the spacings for 250 volts with direct current are also approved for 500 volts alternating current."

Quick-break switches have an auxiliary breaking arrangement, actuated by a spring, making it difficult to draw an arc even if the switch is opened slowly. In general, the quick-break attachment is relatively delicate and apt to get out of order. Where feasible, it is always better to use a switch without a quick-break attachment.

Single-throw knife switches should be so mounted that gravity will tend to open rather than to close them. Double-throw switches can be mounted horizontally, but often when so mounted it is inconvenient to make connections to them, and they do not work in well with many switchboard arrangements; hence they are often mounted vertically and an insulating guard, possibly of wood, is arranged so that it may be slipped over the jaws on the lower terminals of the switch to prevent accidental contact.

Inclosed snap switches are usually preferable to knife switches where it is feasible to use them. Snap switches can be obtained for breaking currents as great as 30 amperes at 250 volts. The unskilled person in opening and closing a knife switch is apt to draw an arc between the contacts and in closing the switch to enter the blades only part way in the jaws; both practices will pit the metal and ultimately ruin the switch. This condition cannot occur with a good snap switch. Only indicating switches should be installed.—*Power and the Engineer.*

## Abstracts from Rules of Department of Electrical Inspection of Kansas City.

Electrical inspectors throughout the country require all wiring to be done in accordance with the rules of the National Electrical Code, of Course. But it is obviously impossible for the Code to undertake any elaborate and detailed consideration of local conditions in different communities—especially when the community happens to be a large city. Thus it happens that electrical departments in the cities frequently find it necessary not only to incorporate the Code rules in city ordinances, but also to amplify and supplement certain of these rules to meet local needs. Moreover, the municipal electrical department can usually, with profit to the patron of electric service and the central station as well, take account of conditions on which the Code has to be silent. For example, the Code could not undertake to specify that only conduit wiring should be used in certain localities.

In view of the foregoing facts, the study of municipal regulations concerning electric wiring is often very helpful and instructive both to the electrician and to others engaged in electrical work. One of the very efficient municipal electrical departments is that of Kansas City, Mo., of which municipality Maurice E. Bates is the City Electrician. Through the courtesy of Mr. Bates, some important abstracts from the rules of his department are given below.

### Conduits.

All conduit boxes and fittings must be securely and firmly fastened in place, and the conduit supported by the use of clips, hangers or other devices approved for the purpose. Clips or other fittings should be used every five feet and on each side of every elbow and fitting. Nails driven in and bent over the conduit, wire hangers, rope or any other similar makeshift device, will not be approved.

All conduit, when run underground, or in basement runs from verticals, and coming up at back of switchboard, etc., should be carefully graded from one end to the other so that no pockets or traps are formed that might by any possible chance receive and retain water or moisture from any cause whatever. *Such graded conduit must be provided with drain upon the low end.*

All pull and other boxes set in basement, ground or other floors where water is likely to be used or to enter from any cause, particularly in garages, must also be arranged to drain. No boxes thus installed that will receive and retain water from the floor will be approved without proper drainage provisions.

Plaster rings or canopy covers must be put on all fixture outlets on lath and plaster work and of proper depth not to extend past plaster line; also on all metal ceilings of sufficient depth to project beyond metal of ceiling.

Conduit boxes having covers designed to provide for drop cords must be provided with suitable approved bushings for the purpose. Ordinary socket bushings will not be approved for this work.

Rigid conduit only with leaded joints and approved weather-proof fittings, will be approved for work on the outside of buildings or exposed to the weather in any way.

In the case of feed wires to small signs on the outside of buildings, or exposed to the weather, a lead-incased armored cable, run in a continuous length from approved fitting within the building to an approved fitting on or within the sign, thoroughly protected from the weather, must be used.

### Metal Molding.

Metal molding is limited to branch circuit work, run open, in clean, dry places, not to exceed 660 watts for each branch circuit, subject to all Code requirements and to the use of all proper devices and fittings necessary to make a complete and finished piece of metal molding work. (Wood molding is prohibited.)

### Meters.

No set rule that will cover all classes of meter installations can be given. For any unusual or special cases outside of the ordinary run, both the meter department of the light company and this Department should be fully consulted, in general.

Meter boards, boxes or cabinets should be located in basement or on first floor, five to seven feet above floor line.

Meter boards, boxes or cabinets must not be placed in inaccessible or hazardous places; consideration must be given for readily reading, inspecting and testing meters.

Coal bins, fruit cellars, laundries, bathrooms, kitchens, pantries, or any places where meters will be subject to mechanical injury, or to injury from steam, condensation, dampness, gases or vapors are not suitable places for meters.

Care must also be taken that meters are located in places where visits of meter readers, inspectors, and testers, will cause the least trouble and annoyance to the consumer.

All meters on conduit systems, except direct-current meters, are to be installed in a closed iron cabinet, or cabinets, individually or collectively, as the case may be, and wires led to and from such cabinet or cabinets in conduit or metal raceways, which are to properly enter and to be secured to cabinet or cabinets with all proper fittings the same as in any other boxes on the conduit system.

Direct-current meters will be subject to special arrangements, in most cases, particularly if they are to be installed in groups.

Meter boxes must be of sufficient size to admit of meter, cutouts and switches without crowding. For space to be allowed for meters, if different types and sizes, call up or consult the meter department of the lighting company.

In the case of meters installed in groups, unless one large box is installed, these boxes are to be set in gangs, and to connect from box to box with conduit or metal raceway for the running of mains; no open wiring around the meter board will be permitted.

When installed in gangs, whether in one or more rows, they must be set in a true level line and uniformly spaced not less than 20 inches from center to center horizontally, and not less than 24 inches from center to center vertically.

The switch for each apartment, together with branch blocks, may also be located in these cabinets, provided suitable provision has been made for so doing, the main entrance switch and fuses to be located in a separate box provided for that purpose.

If necessary to run more than two branch circuits from any one of these boxes such box must also have a main block properly fused to feed these branches.

These boxes must be of not less than No. 16 U. S. gauge metal, thoroughly painted inside and out with some waterproof paint that will prevent rust and corrosion. Boxes must also be provided with hinge doors and suitable snaps and catches.

Sheet asbestos or mill board must not be used for the lining of any switch, cutout, panel, meter boxes or boards. Its use around electrical devices is prohibited.

Whenever fireproof mounting is required use slate, asbestos shingle, lumber, transite, ebony or any other similar solid, fireproof medium.

### Wiring.

All installations of lights for less than four circuits shall be made on a two-wire system.

All installations for four circuits or more shall be made on a three-wire system.

All installations requiring two or more meters shall be made on a three-wire system.

All neutral wires in a three-wire system must be of the same size as the outside wires, except in a convertible three-to-two-wire system, when the neutral wire must be of the same size of the combined area of the outside wires.

On a three-wire two-phase system the common return for both phases must be of a size equal to one and four-tenths the size of either outside wire, the common return being assumed to be in the middle.

All branch circuits or taps from any three-wire system which are directly connected to lamp sockets or receptacles either direct or through fixtures, must be run as two-wire circuits.

In all basements or cellars, other than residences under 14 rooms, wires must be run in conduits, whether the balance of the installation is in conduit or not, and weatherproof sockets or flush receptacles in boxes, must be used.

The distance from the floor to the socket must not be less than seven feet, and no slack or surplus wire that will permit of socket dropping to less than seven feet will be permitted.

In low basements, receptacles may be used, but if less than seven feet from floor to receptacle, each lamp must be provided with a lamp guard.

All basement lights in residences, stores, etc., should be controlled by switch located at head of stairs leading to basement.

Sockets with metal shells must not be installed within reach of floors, when such floors form a part of an electrical path to earth; this applies to all basements with cement or earth floors, tiled bath rooms, or in any place where granolithic concrete or other floors that might form an electrical path to earth, are used.

Combination brackets must not be installed in cellars.

All sockets placed within reach in such places must be porcelain, or have non-conducting shells, or else have light out of reach from floor and operated from wall switch.

Any device consuming over 500 watts must be taken from a separate branch circuit.

Any device consuming over 660 watts or 6 amperes at 110 volts, must be taken from a separate main from the feeder, this to include such devices as large flat irons, heaters, and the various other domestic utilitarian devices now coming so commonly into general use.

### Services.

In bringing service entrance wires out of buildings to be supplied by overhead service, the outlet must be so located that the subsequent erection of an adjoining building will not render it inaccessible; that is, the main must be brought out at the front or rear wall of building, unless there is ample yard room at side. Exception may be made also where one side of the building is on a street or alley, if existing conditions seem to require it; this, however, would constitute an exception and not a rule.

In the case of underground services, service must enter and be run in conduit within the building, terminating in a metal fuse and switch box in the nearest readily accessible position to the point of entrance, or may be run in conduit directly to main fuses and switch on board, in conduit, if such board is located near entrance.

For overhead systems rigid conduit with approved weatherproof fittings only will be required for service entrances, to extend from the first point of attachment of service wires from pole line on the outside of building to the meter board, cabinet or box within the building.

In the case of an underground entrance from an overhead line, such service must be run in conduit with lead-incased wire, in continuous length without splices.

Service entrances must not be made with open wiring run on or under porches, balconies, shed roofs or awnings, or along the sides of buildings or near any combustible material, and only as stipulated above.

Perhaps it should be explained that the foregoing abstracts do not include all the rules relating to any one subject; only such of them as are throught to be of special interest are given.

## A Contractor's Store.

Much has been written lately on the value of the proper sort of window advertising in electrical merchandizing. It is a fact, of course, that a well designed window display is too valuable an asset to be overlooked or disregarded by the progressive merchant. The merchant, however, should not lose sight of the further fact that the interior of the store, as well as the window, ought always to be kept as attractive as possible. The window display serves to arrest the attention and arouse the interest of the person who may possibly enter the store and become a purchaser, but it does not usually make the sale entirely sure. The appearance of the store room itself should be such as to retain and make stronger, in the minds of those who enter, the good impression created by the window.

Section of An Electrical Contractor's Store.

Aside from the above arguments, cases sometimes arise in electrical merchandizing in which the design of the store building is not such as to make the arranging of an effective show-window display at all convenient. This is the case with the store shown in the accompanying photograph, which is that of the Central Electric Company, of Battle Creek, Mich., of which L. R. Greusel is the secretary and general manager. Mr. Greusel manages, however, to keep a display of goods arranged in his store so as to be quite attractive from the outside, and also so as to make the place very pleasing when viewed from the interior. Moreover, the stock is disposed in such a way that goods can be shown the customer and their qualities demonstrated with the minimum amount of inconvenience.

The company carries a big line of fixtures and glassware, and samples of nearly all the fixtures are arranged so that they can be shown with the proper lamps burning in them. At a convenient distance below the ceiling of the store, and parallel with the ceiling, a line of rigid conduit runs along the middle of the room, from the rear all the way to the front. Every four feet a tee condulet is inserted in this pipe, and from each tee there is a vertical drop of eighteen inches to a second tee, through which a line of conduit extends crosswise the room to the wall on either side. Each one of these tranverse lines of conduit has eight condulet receptacles with fusable attachment plugs, and, through these, eight lighting fixtures, suspended from the conduit, are supplied with electric current. There are twelve of these lines of conduit running across the room, and the wiring is so arranged that the current may be turned on each line separately.

The shelves in the store are also wired in such a way that the glassware on them may be lighted up wherever it is desired to do so.

When all the lamps in this store are turned on there are 440 incandescent lamps burning at one time. The store is situated one block from the heart of Battle Creek, on the principal street of the city. When it is lighted up in the evening it is more like, in intensity of illumination, the remarkable show room of the New York Edison Company, on Forty-second Street, New York, than almost any other place to be found anywhere.

Manager Greusel says he finds a brightly lighted store the best sort of a business getter. Moreover, he thinks the display in his store is an advertisement for conduit wiring. He believes in conduit work, and his firm does a great deal of the big conduit jobs, as well as much wiring of the other kinds, in and around Battle Creek.

It is seldom one finds in a small city an electrical store in which so much attention is given to the matter of arranging goods attractively and conveniently.

## Among the Contractors.

The Sands Electric Company, Wheeling, W. Va., has completed the work of rewiring the federal building for electric lighting.

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The contractors of Salt Lake City expect to have a city electrical inspector appointed in the near future, a new city office having been created for that purpose.

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The Rex Electrical Supply Company, of Joplin, Mo., has lately finished the wiring in the new building of the Newman Mercantile Company in that city. This firm, of which Rex L. Camblin is the manager, is also doing a large business in installing electrical equipment in numerous mines around Joplin.

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The American Electrical Company has received a contract for the wiring of the new chemical-engine house in Wheeling, W. Va. As the contract stipulates that union labor shall be employed, it was necessary for all of the employees to affiliate with the Electrical Workers' Union.

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The Salt Lake Electric Supply Company, of Salt Lake City, Utah, is at present installing the electrical work in the new 19-story Walker Bank Building, the new addition to the Post-office building, and the Utah Hotel addition. The company has also just completed installing the electrical work in the Auerbach Store Building.

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The Reno Electrical Works, Reno, Nev., is completing the electrical installation in the State Capitol building at Carson City, which has never been wired until this contract was let. The contract includes a modern installation of conduit throughout and all fixtures for the buildings and grounds. Among other work that the Reno Electrical Works has done within the last few months is the installation of three hydroelectric plants in the Carson Valley.

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E. H. Eardley & Brother, of Salt Lake City, has recently moved into larger quarters at 39 Post-Office Place. This company has the contract for the electrical work and will furnish the fixtures for the Zion Savings Bank & Trust Company's building, which is being entirely remodeled.

It is a matter of interest that E. H. Eardley helped to install the original wiring in this building, about 1888, no porcelain whatever being used in the job. The new work calls for the highest type of modern electrical construction.

## J. T. Marron.

To people who have attended conventions of the National Electrical Contractors' Association or of the Illinois Electrical Contractors' Association, J. T. Marron needs no introduction. He has never missed a convention of either one of these bodies, and, furthermore, his participation in the discussion of matters which come up for consideration then and the wisdom of his opinions in these discussions are always such as to give him rank among the leaders. To him belongs the distinction of being the first electrical contractor west of the Allegheny Mountains to join the National Association; he sent in his check for membership in that organization on the same day that he received from the New York contractors the original notice that a National association was to be formed.

Mr. Marron is a member of the Board of Directors of the National Electrical

J. T. Marron,
President, Electric Construction & Machinery Company.

Contractors' Association, on which board he has served continuously during the past eight years. He is also past-president of the Illinois state association. At the last convention of the latter organization, held in Chicago a few months ago, a movement was started looking toward the better education of the electrical contractors of the state in matters of cost-keeping and making estimates on prospective contracts. Mr. Marron was one of the originators of this movement and was made the chairman of the committee which is now engaged in devising a practical, state-wide campaign of education along these lines.

The Electric Construction & Machinery Company, of which J. T. Marron is the president, has its headquarters at Rock Island, Ill. It does a general electrical-construction business and also makes a specialty of power and lighting equipment of factories. It has, in fact, equipped most of the large factories in this territory. Before becoming president of this firm Mr. Marron was first with the General Electric Company and later with the Peoples Power Company of Rock Island. He has been engaged in electrical work for 24 years now, having entered the employ of the General Electric Company when he was but 16 years old. While associated with this company his time was given mainly to construction and to the installation of apparatus, but for the People's Power Company he devoted his time entirely to electrical-construction work.

In addition to the organizations already mentioned, Mr. Marron is a member of the American Institute of Electrical Engineers. He is also Statesman in Illinois for the Sons of Jove. He says that he is going to have a Rejuvenation in Rock Island when the Illinois Electrical Contractors' Association holds its convention there—which will be on June 15. He is expecting this convention to be one of the best state meetings yet held, and is also very enthusiastic over the approaching Denver convention of the National Association. He is a member of a committee appointed to boost the attendance from Illinois at this latter meeting, and in that capacity is constantly doing his full duty.

## Knob-and-Tube Wiremen.

It is sometimes argued that certain communities cannot afford to encourage conduit wiring for the reason that men skilled in the installation of conduit work are locally scarce. In view of such assertions as this, it is interesting to note that, on the contrary, in many places over the country it is harder to get a man who can do high-class knob-and-tube work than to get good conduit men. This is said to be the case in Chicago, and similar conditions are reported from other quarters.

It should be explained, perhaps, that in Chicago knob-and-tube wiring is not permitted, but it is employed extensively in suburban places around the city, and the suburban contractors complain frequently of the scarcity of knob-and-tube wiremen.

## Fuse Protection.

An inspector in Chicago while examining an electrical installation on an electrician's premises a day or two ago captured a liberal supply of fuse plugs from which the fuses had been removed and a No. 14 wire substituted. In making the substitution, the mica window was removed from the plug, the fuse wire taken out, and the ends of a short piece of the copper wire soldered to the points of contact from which the ends of the fuse wire had been removed. These plugs were employed to protect (?) six-ampere circuits.

Electricians will use materials on their own premises which they could not recommend to anybody else. This sets a very bad example.

# National Electrical Inspectors' Association

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Frank R. Daniel, R. P. Strong, Henry E. Knight, Washington Devereux, James B. McCarthy, Wm. Lincoln Smith, James Bennett, C. W. Mitchell, George L. Collison, T. H. Fritts, James S. Meade, Thos. Henry Day, James E. Cole, Thos. D. McColl

## Secretary's Message.

The Secretary desires to call attention to the question which refers to the use of rosettes and similar appliances as supports for the circuit under certain conditions. The opinions were nearly evenly divided and in consequence it may be worth while to make a few remarks on the subject.

One gentleman who feels that additional supports should be called for refers to the provision regarding electric signs, Rule 83*e*. Here there occurs a definite statement of when the receptacle may be used as a support, and it is naturally a strong inference that it would not be proper under other conditions, or we should find similar provisions elsewhere.

Another gentlemen gives a reason for his belief which really goes to the root of the matter. This is, in general, that no current-carrying contact mechanism should have to act as a support also—except when distinctly constructed and approved to serve the double purpose.

In the case at hand we find that the strain in the wires will tend, if any expansion under heat occurs, to loosen the contact; and this will do two things: first, reduce the solidity of the support, and, second, cause a further local heat development, the tendency of both being to cause the screw, which, at best, is none too large and is held by only a few threads, to lose its grip so that the least provocation will start a tiny arcing; and this in time will slowly but none the less surely cause the wire to give way, especially as it is a cumulative effect and progresses according to the "compound interest law."

This action is not only possible but has been observed, and is alone sufficient in the absence of any direct prohibition in the Code to justify us in rejecting the practice as certainly opposed to the spirit of the Code.

In regard to the question concerning the use of "canopy covers," it would seem that the matter is one of good engineering design and workmanship, the matter being handled in the Code in Rules 27*b* and 28*d*. It is obvious that some of the gentlemen misunderstood the question in spite of the fact that the questioner gave in illustration the name and designation of a fitting which illustrated his meaning—of course, in accordance with our custom, this is omitted in the question as printed.

The question does not mean putting a cover on the box as a temporary matter to protect its contents and the conduits terminating in it from injury from the time of its installation till it is finally put into use. There is a proviso in Rule 59 for the making of such covers, but there is nothing in either 27 or 28 which requires their use.

It often happens, especially where fixtures are made up in special designs, that the fixture canopies vary in diameter. Or it may be that boxes are found a little crooked with the plane of the plaster grounds, the plasterer having experienced difficulty in properly "floating" the surfaces. The questioner had these conditions in mind, and the question refers to the permanent placing on the box of a cover, presumably with a flanged central opening—though this is not necessary,—which reduces the diameter of the opening and makes it certain that the canopy, whether with or without an insulating ring, will make a close fit against the surface and that the rule specifying that the opening shall have no gaps or open spaces about it is complied with.

The final reply in the set of answers seems to hit the point, but as was said at first, it would seem to be rather more of a matter of workmanship than anything else.

**The matter appearing in this section consists of questions on the National Electrical Code, its interpretation and meaning, and questions as to whether certain methods of wiring are in accord therewith. These questions are gladly received from anyone interested, even if not a member; they should be sent to the secretary with any needed elucidating sketch. They are answered by each member of the Executive Committee according to his knowledge of what the ruling would be in his jurisdiction.**

**It should be understood that no pretense is made to give an authoritative interpretation of the Code. This is a voluntary association; it has representation on the Electrical Committee of the National Fire Protection Association, which prepares the Code, but it has no right, and claims no right, to give a final interpretation of anything in the Code. It is only intended to give the interpretation which seems correct to the members of the Executive Committee. No attempt is made to edit or correlate the answers from the different members of the Committee, as it is felt that the occasional difference of opinion is calculated to lead to a further study of the matter in question, further discussion and the final clearing up of obscure points.**

**The aim is to help toward a better understanding of the Code on the part of all; a more uniform conception of its meaning; increased precision in applying it; and harmonious action of those using it, for the common good.**

### Supports for Exposed Circuits.

**Question 175. Suppose a number of rosettes, receptacles, etc., are placed on a straight run of wire not more than 4.5 feet apart, and their terminals carry the wires at the required distance from the surface wired over. May these devices be depended on for supports or must insulators be installed also; and in this case what should be their position in relation to the fittings?**

Answer 1. No insulators would be required except at dead end as called for in Rule 26*h*.

Answer 2. I see no reason why the rosette terminals may not be used as insulating supports for the circuit wires, provided the line be properly anchored at either end by cleats or knobs.

Answer 3. In cases referred to, it is necessary to have suitable supports independent of rosettes connected to circuit. There is no requirement which states just where these supports shall be installed, but we prefer them close to rosettes connected to wires.

Answer 4. Rosettes or receptacles are not considered as supports, and Rule 26*h* should be complied with by placing regular supports every four and a half feet, and if the end of the

run is at a rosette or receptacle, the last support should be not over 12 inches from same. The one exception to this requirement occurs in Rule 83*e*, covering exposed wires on electric signs, in which case receptacles holding the wire one inch from surface are considered sufficient supports, if not over one foot apart.

Answer 5. Under the conditions expressed in this question, I should rule that it was not necessary to use the additional support for the wires between the rosettes or receptacles. In fact, such a requirement would be an unnecessary expense for which no compensating good would result. I would, however, suggest that Section *h* of Rule 26 be observed in relation to the "of the run," to wit: "Must not be 'dead-ended' at a rosette socket or receptacle unless the last support is within twelve inches of the same."

The last support before the last rosette or receptacle, as expressed in the question, is 4.5 feet from the end of the run; hence the need of a support to relieve the terminals of the rosette, or other form of fitting, of the resultant strain.

Answer 6. Yes, but additional supports must be furnished at each end, so that run will not be dead-ended at a rosette or receptacle.

Answer 7. Supports should be provided on wires at least every four and one-half feet, regardless of the installation of receptacles and rosettes, and are to be so located as to relieve the contacts on these devices from strain.

Answer 8. Supporting cleats or knobs must be placed at least every 4.5 feet apart, but the last one may be inside the last rosette if not more than 12 inches from the same.

Answer 9. To depend on the rosette or receptacle terminals for supporting the wiring circuit would not be to "rigidly support" the wires, as is required by Code Rule 26*h*. Furthermore any accidental strain to which the line is ever subjected would act directly upon the current-carrying contact of each service, tending to loosen such contact, producing heating and possibly arcing. Rosettes and receptacles should in no case be allowed to act as a support to the circuit wires; that is the function of the knob or cleat insulators.

We require a cleat or knob on each side of each rosette or receptacle, set as close as may be; on flat surfaces, not more than two inches from the device, although on ordinary open-joist construction we permit the support to be placed on the next joist.

### Covers for Outlet Boxes.

**Question 176. What is the practice in your territory in regard to requiring canopy covers with concealed conduit outlet boxes? Do you require such a cover where it is presumed that the ordinary fixture with canopy will later be installed, or do you accept the four-inch standard box set to finish flush with the plaster, with no cover at all? The latter course makes it difficult to secure a satisfactory finish with a four-inch canopy using some of the approved fibre-ring canopy insulators which do not cover more than a four-inch circle of plaster. Is there any Code rule under which such a cover could be required?**

Answer 1. We do not require covers as suggested in this question.

Answer 2. Our practice is to require some kind of cover for every unused outlet box unless it is known that a fixture is to be attached within a few days. We have no difficulty in requiring this under Rule 59*c*.

Answer 3. We do not require a cover on an outlet box which is to be covered by the canopy or fixture to be installed at said outlet, but this outlet box must either have a cover or be covered by a canopy before wiring is approved for current.

Answer 4. Wires at all unused outlets should be properly safeguarded to prevent wires coming in contact with each other or surrounding surfaces, which condition would clearly be in violation of Code requirements. Where outlet boxes are used and are not covered the outlet wires within same are certainly not inclosed within the conduit system, and are therefore in violation of the rules—being in contact with each other and with metal of the outlet boxes.

Answer 5. The third paragraph of Section *d*, Rule 28, might answer the question: "The outlet box or plate must be so installed that it will be flush with the finished surface, and if this surface is broken it shall be repaired so that it will not show any gaps or open spaces around the edge of the outlet box or plate."

Engineering skill and common practice would suggest a treatment for the condition brought out in this question, that is, if my understanding is correct. A fitting having a smaller diameter than the canopy to be used should be installed. Otherwise, I fail to understand how the rule quoted will have been observed. I would appreciate, however, an illustration of the condition that I might understand it better.

Answer 6. Yes; Rule 28*d*.

Answer 7. All outlet boxes should be equipped with canopy covers or outlet plates. If it is intended that fixtures be installed at a later date, these plates or canopies may be removed.

Answer 8. I do not know any rule requiring such a cover, but I think it a good thing to use, and frequently suggest it. It is a matter of engineering, however, and cannot be made a matter of compulsion.

Answer 9. I know of no Code rule requiring such canopy covers, but I believe there should be one. A three-inch opening appears to be sufficient for all operations probable at the fixture outlet, and where a four-inch box is used, it should be provided with such a reducing cover. Otherwise it often becomes necessary to use a five-inch canopy in order to insure proper insulation of canopy from box. The slightest projection or box from finished-plaster surface increases still further the necessary diameter of the canopy and many small fixtures are thus thrown out of proportion to such an extent that there is an ever present tendency to remove or omit the canopy insulator, and to reduce the size of canopy to the exact diameter of the box, sacrificing the desired insulation between fixture and conduit system.

### Connecting Rigid Conduit with Short Lengths of Flexible.

**Question 177. In some places it is occasionally desirable to connect a rigid conduit riser with a horizontal line by means of a short length of flexible, as where one goes up an elevator shaft or similar opening and through to the several floors where a large and variable load may give rise to the need of considerable elasticity. In such a case must the rigid and the flexible be joined at each end by a box under Rules 27*a* and 28*b*, or may some of the coupling devices other than a box be used?**

Answer 1. No outlet boxes would be required if approved coupling devices were used.

Answer 2. Some suitable fitting, such as an outlet box, junction box or splicing condulet, must be used.

Answer 3. They may be joined by an approved box or by an approved coupling device.

Answer 4. The questioner does not specify whether the word "flexible" refers to armored cable or flexible steel conduit. If armored cable is used it must be continuous between junction or outlet boxes (Rule 27*a*). If flexible steel conduit is used, no special rules apply, other than ordinary conduit rules, and the flexible portion may be connected to the rigid conduit by any approved coupling.

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Answer 5. The connection between rigid conduit and flexible conduit can be made with an approved fitting, and the wires drawn in afterwards. The connection between rigid conduit and armored cable could be made only with an approved junction box, on account of the necessary splices between the cable and wires drawn into conduit.

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Answer 6. Where flexible and rigid conduit are used in the same run, same should be made continuous by use of approved couplings or outlet boxes, so as to afford a continuous raceway.

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Answer 7. An outlet box, or a junction box is not necessary, under the rule, for a condition like that expressed in the foregoing question. Care should be exercised, however, that the short piece of flexible conduit be properly supported and thus prevent difficulty in drawing in the conductors.

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Answer 8. Where the flexible conduit meets the riser a box must be used. Where the flexible meets the horizontal a simple coupling device is ample.

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Answer 9. The flexible conduit must be joined to the rigid conduit riser (except possibly on the top floor) by means of an approved junction box or cabinet. Where the flexible joins the lateral conduit for each floor, however, a combination coupling may be employed, such as is approved by the Underwriters' Laboratories for such use. The box would be required at an outlet or a junction but not necessarily where the conduit merely changes its form from rigid to flexible, provided an approved combination coupling is used, and provided further that the conductors and their insulation are continuous.

# Public Service Commissions

## MARYLAND.

An investigation into the rates charged for gas and electricity by the Consolidated Gas Electric Light & Power Company will begin this month. Action was begun last June on the part of the Mayor and City Council of Baltimore and others against the Company alleging that the rates were too high but the matter has dragged until now. All other business will be laid aside in May and an effort will be made to push the case to a conclusion. The Company has submitted to the Commission a great volume of papers bearing on the case and a valuation of its property. It also claims the right to earn dividends on some $16,000,000 of what it terms intangible assets. A development of the situation is a proposition to adopt the London sliding scale for both electricity and gas, and Chief Engineer Charles E. Phelps of the Commission has worked out a set of tables with this end in view. Officials of the company are anxious to have the sliding scale put into effect provided the basic rate is sufficient to allow dividends on the present capitalization, which includes about $12,000,000 of water, practically the entire issue of common stock, but which is now selling around 112 and paying six-per-cent dividends. An unusual situation was the holding up of a proposed issue of $700,000 of common stock of the company on petition of Albert Ritchie, assistant general counsel of the Commission. At the last session of the Legislature a bill was passed authorizing the Commission to assign a member of its legal staff to act as "people's advocate" in such cases as that of the gas investigation and in others where the public might not be represented by counsel. Mr. Ritchie was assigned as "people's advocate" in the gas company's case and his first move in this direction was to oppose the issue of stock. The Commission had previously authorized the issue of $1,500,000 of stock, of which $800,000 had been issued to approximately that amount of prior lien bonds of the company. When the company notified the Commission that it intended to issue the remaining $700,000 Mr. Ritchie objected. He made the point that there is already too much water in the company, and although the new stock was to be issued for cash at par, it would become mixed up with the stock which represented no value, and it would make the proceedings looking to the squeezing of the water out of the company's capitalization more difficult. In his petition he stated that his investigations had tended to show that the entire outstanding capital stock of the company as well as a considerable portion of its bonds are not and never were represented by any investment at all, but constitute pure and simple inflation. He asked for the rescinding of the original order as far as it applied to the $700,000 of stock about to be issued, but if the Commission did not feel that the order should be rescinded, that it amend its order so as to embody specifically the Commission's understanding that the authority to issue the stock shall not be taken or construed as recognizing any right on the part of the company to earn dividends thereon or to restrict the Commission in any way in fixing rates for both gas and electricity. This brought a vehement protest from the company but the Commission held a hearing at which the Company said that arrangements had already been made to issue the stock, that it would be a hardship on the Company to prevent it, that valid contracts had been made for the erection of the largest gas holder in the United States and for extensions and that these were to be paid for with the proceeds of the sale of stock, that the Company had no other means of paying for them, that rights to purchase the stock had been given to the present stockholders, that these rights had value and had been bought and sold, and that the proceedings were altogether unheard of. The Commission passed an order permitting the issue of the stock but declaring that the purchasers are bound to know that the Public Utilities Act is in force in Maryland, that there is such a body as the Public Service Commission empowered and obliged to enforce it, "that the Commission has jurisdiction and authority under its terms to fix and alter from time to time the rates and charges of all pub-

lic-service corporations in this State and that therefore all purchasers of securities approved by this Commission, whether issued by the said Company or any other public-service corporation in this State, take the same subject to the risk of the rates of the corporations by which the same are issued being fixed by the Commission with due regard, among other things, to the question as to whether the capitalizations of such corporations are unwarrantably inflated." The action of Mr. Ritchie in seeking to restrain the issue of the stock and the decision of the Commission that the purchasers must buy it with their eyes open caused a decline of several points in the stock.

The Commission has just filed an opinion and order interpreting its order of January last establishing a schedule of telephone rates for Baltimore. By its order of last January the flat rate for business houses was abolished and all subscribers of this class were put on a measured basis. In drawing up the schedules, provision was made for large users of the telephones in two schedules, *B* and *E*. The minimum rate for schedule *B* provides for 5,400 calls at $147 a year. Additional calls under this schedule are to be charged for at 3 cents each, with the provision that extra calls may be purchased in blocks of 600 at 2 cents each. Schedule *E* is the private-branch-exchange rate. This calls for a switchboard with operator's set, two trunk lines, and 3,000 local messages for $258 a year. Additional local messages are 3 cents each with the provision that additional messages may be contracted for in blocks of 900 at 2 cents each. The company contended that under this ruling the subscriber was obliged to contract for such additional blocks of calls as he might require at the time of making his contract, and that he could not be allowed to buy such blocks of calls, and thus get the benefit of the wholesale rate at any other time. Thus if he found that he was using up his contracted-for calls more rapidly that he anticipated, he could not, in the latter months of his contract buy additional blocks of calls. The alternative was given him however, of making a new contract. This ruling on the part of the company caused a great deal of complaint and the Public Service Commission was besieged with requests for an adjustment of the matter. A hearing was held and the company maintained its position with the utmost vigor, contending that in the interest of efficient service it was important for the company to know in advance what demands would be made upon it in order to distribute the lines on the switchboard so that they might be handled with the greatest promptness and the least inconvenience. The Commission in its order overruled the company and held that it never intended any such interpretation as that put upon the order by the company, and that the matter would have to be settled in accordance with the Commission's understanding of its order, that it had no other idea than that the right to purchase additional calls in blocks of 600 and 900 might be exercised at any time.

Numerous complaints had also arisen as to the interpretation of Schedule *F* of the residence service which provides for 30 calls a month at a charge of $2. The company held that while the contracts were annual contracts, they did not call for 360 calls a year, and that the calls were not cumulative, that a subscriber using ten calls in one month and paying $2 and using 40 calls the next month would have to pay his $2 and five cents each for his additional calls, and that his unused 20 calls in one month would not offset his extra ten in the next month. The Commission held that this interpretation was also wrong, that it intended the calls to be cumulative, and that while the subscriber might be called on to pay his $2 a month with five cents each for any calls over 30 in any one month, in the monthly settlements, that at the end of the contract period there would have to be an adjustment on the basis of 360 calls a year, with the five cents each for extra calls, with a refund where necessary. These rulings uphold the contentions of the subscribers at every point. No little dissatisfaction has resulted from the new schedule principally on the part of those who will lose the unlimited service and an organization, the Protective Telephone Association, has been formed to look after the rights of subscribers. Officials of the organization assert that the scale of rates for telephone service is too high, and does not solve the problem of the alleged bad system of telephone charges.

## RHODE ISLAND.

The members of the Public Utilities Commission created by a recent act of the Legislature to supervise the public-service corporations of the State, have been appointed. They are William C. Bliss of East Providence, chairman, for six years; Samuel E. Hodson of Woonsocket, for four years, and Robert F. Rodman of North Kingston, for two years. The chairman will receive $4,000 and the other two members $3,500 each, annually. All are Republicans and have been prominent in politics. Mr. Rodman was formerly engineer of the State Board of Public Roads.

## NEW YORK.

The Public Service Commission for the First District has completed the legalization of the Steinway Tunnel rapid-transit route, which will be part of the dual system of subways. The tunnel is said to have cost between $7,000,000 and $8,000,000, but the Interborough Rapid Transit Company proposes to turn it in to New Y rk City at $3,000,000 as a part of the extended subway system, which is to be operated by that company.

The Public Service Commission, Second District, has authorized the Lewiston and Lake Ontario Shore Power Company to exercise franchises and to furnish electricity in the villages of Lewiston and Youngstown, Niagara County. The company is also authorized to issue stock to the par value of $25,000.

The Commission has received notice from the Conservation Commission that it believes that it is no longer safe for the New York Central, Delaware and Hudson Company and New York and Ottawa Railway to operate coal-burning locomotives through the Adirondack forest preserve. In consequence of this notice directions were sent to these companies to prepare immediately for the installation of oil-burning engines. On notice from the Conservation Commission on April 20, the Public Service Commission required the New York Central to install oil-burning engines on the Saranac Division on April 22.

## OKLAHOMA.

A proposed order has been promulgated by the Oklahoma Corporation Commission which would require all telephone and telegraph companies owning poles, towers or other frame structures to have stenciled on the structures before January 1, 1913, the initials, abbreviation of the name, or a corporate symbol of the company, or some other distinguishing sign. It may be put on with paint or as a metal tag.

The question of a minimum charge for electricity, which has been before the Oklahoma Corporation Commission before in various forms, has again been brought up by a complaint from the El Reno Broom Company against the El Reno Gas & Electric Company. It is complained that a minimum of $1 a month per horsepower is charged and that the actual consumption is less than that. Therefore the broom company wants an order from the Commission requiring the electric company to charge only for the current consumed. The Oklahoma Supreme Court decided in a recent opinion that the Commission could not control the charges within an incorporated town where the company was working under a franchise granted by the town.

# Among the Supply Men

## Plans for Electrical Supply Jobbers' Meeting.

Plans are being rapidly completed for the meeting of the Electrical Supply Jobbers' Association at Atlantic City, N. J., at the Hotel Chalfonte, May 22, 23 and 24. Sessions will be held on the morning and afternoon of these days, and an interesting entertainment program arranged.

Special cars for the western contingent will leave Chicago, via Pennsylvania Railroad, Union Station, on Tuesday, May 24 at 10:30 a. m. Applications for reservations should be made at once to L. W. Kittman, 411 South Clinton Street, Chicago, Ill.

C. A. Swartz, formerly of the Scientific Materials Company, Pittsburgh, Pa., is now connected with the Ludwig Hommel Company. He is covering Western Pennsylvania and Eastern Ohio. The company is sales agent for several large electrical manufacturing houses.

The Doubleday-Hill Electric Company, Pittsburgh, Pa., held its sales convention in Pittsburgh on April 22. This is one of the most active supply houses in the country. The officers are C. Phillips Hill, president; G. Brown Hill, vice-president and treasurer; Daniel Shaler, secretary; Frank Slocum, assistant secretary. The company does a small retail business, but does not make a distinct department of this. The business was established in 1895, and the company has just moved to a fine eight-story building on Liberty Street near Fifth Avenue.

The Harry I. Wood Company, of Louisville, Ky., reports the organization of the Harry I. Wood Co-operative Club, sustained by the members of this organization. This club meets every Monday. The company operates in Louisville, Ky., Tennesee, and southern Indiana.

The Southern Wesco Supply Company, Birmingham, Ala., is conducting a special sales campaign on Emerson, Wesco, Trojan, Peerless and Cyclone fans, and Sangamo type "H" meters. The company has just opened up an automobile accessory department, which will be in charge of James G. Fitzsimmons.

The Frank H. Stewart Electric Company, Philadelphia, Pa., announces that its new six-story building, which is going up on the site of the first United States Mint in Philadelphia, is nearing completion.

The Johnson-Kennedy Electric Company, Cincinnati, O., is conducting a special campaign on Pacific Electric "Hot-Point" irons and other devices. This business was established June 1, 1907. The president of the company is Claude H. Johnson. The company does very little retail business, its wholesale territory covering Ohio, Indiana, West Virginia and Kentucky.

The Montana Electric Company, Butte, Mont., is having a lively sale to the retail trade of tungsten lamps. The selling organization of this company covers Montana, southern and central Idaho, and northern Wyoming. The men on the road do not report any unusual business in any lines. H. W. Turner, president of the company, has returned from California, where he spent the winter. G. B. Perier is secretary-treasurer of the company.

Agens & Hopper, Newark, N. J., are conducting a very active campaign on fan motors in New York City and New Jersey, north of Trenton. The company has a large store near the center of the business district of Newark, and its retail sales form a large proportion of the business. The wholesale and retail departments are kept as distinctive features of the organization. The company reports fairly active buying among the contractors in central New Jersey, and the demand for Westinghouse tungsten lamps has been very large and is now on the increase. The business was established in 1898, and the company was incorporated May, 1911. The officers of the company are S. H. M. Agens, president; Roland I. Hopper, vice-president and treasurer; Ira P. Salmon, secretary and assistant treasurer.

One of the enterprising supply houses of the capital city is the National Electrical Supply Company, Washington, D. C. The retail branch of this company's business is growing every year and bringing in a good profit. The company is pushing electric heating devices, and will conduct a three-weeks demonstration on these devices this month. The selling organization covers the nearby territory of Maryland, and the States of Virginia, West Virginia, Missouri, and South Carolina. The company is the successor to Royce & Morreau.

The McClary-Jemison Machinery Company, Birmingham, Ala., reports a decided general improvement in business during the first quarter of 1912 over the latter part of 1911. This company conducts a wholesale business only, and covers a large territory in the southern states. The business was established in 1904, and the president is John S. Jemison.

The Gee Electric Company, Wheeling, W. Va., holds a sales meeting about twice a month. This company does a small retail business, but does not feature this part of its work to any extent. The business was established in 1899, and the selling organization covers West Virginia, eastern Ohio, and northwestern Pennsylvania.

The Commercial Electrical Supply Company, St. Louis, Mo., does a very limited retail business, its selling organization along wholesale lines covering Iowa, Nebraska, Wyoming, Colorado, Kansas, Arizona, New Mexico, western and northern Texas, Oklahoma, northern Louisiana, Arkansas, Missouri, half of the state of Illinois, Indiana, western Ohio, Tennessee, Kentucky, Alabama, Georgia, and Mississippi. This company conducts special sales campaigns on seasonable goods and specialties, at the present time pushing fans, lightning arresters, and a special line of bargain chandeliers. The company is experiencing an active demand for switchboards, for new and used motors and generators, and its repair department is busy. The company holds its sales convention each December. The officers of the corporation are Louis T. Nolker, the corporation are Louis T. Nolker, president and treasurer; William H. Nolker, vice-president, and Robert E. Nolker, secretary.

# Pittsburgh Meeting of Electrical Engineers.

## American Institute and Iron and Steel Engineers Hold Joint Meeting.

The 272nd meeting of the American Institute of Electrical Engineers was a joint meeting with the Association of Iron and Steel Electrical Engineers, under the auspices of the Pittsburgh Section and the Industrial Power Committee of the Institute. Sessions were held at the Fort Pitt Hotel, Pittsburgh, Pa., on April 25, 26 and 27. A Dutch dinner was held on Thursday evening, at which K. C. Randall, of the Pittsburgh Section, presided, and addresses were made by Charles F. Scott, F. B. Crocker and C. P. Steinmetz, all of whom are past-presidents of the American Institute; by Gano Dunn, the present president; by E. Friedländer, vice-president of the Iron and Steel Electrical Engineers; by J. R. Reed, of the Vancouver Section; by W. A. Hall, of the Lynn Section; by H. E. Clifford, of Harvard University; by J. C. Reed and P. M. Lincoln.

On Friday afternoon a special car took the members and visitors to the steel works at Homestead and to the works of the Westinghouse Electric & Manufacturing Company, return to the city being made in automobiles. The total registration at the meeting was 222.

Gano Dunn, president of the American Institute, called the first session to order on Thursday morning and a paper was presented by C. J. Fechheimer on "Self-Starting Synchronous Motors."

This paper was a long and detailed analysis of the starting conditions in polyphase, revolving-field synchronous motors with tests of actual performance. The starting torque expressed in synchronous watts is equal to the power input to the motor in true watts. This principle is extensively applied. To secure large starting torque with small currents from the line, it is essential to make the losses in the motor high by using large resistances, to minimize the reactance, to keep resistance of stator low and to keep magnetomotive force for air gap low. The non-uniformity of starting torque is carefully examined, and attention called to the harmful effect of delta connection. The rapid change in characteristics near synchronous speed is pointed out. The following laws are given: (1) The starting torque varies as the square of the impressed voltage. (2) The current varies as the first power of the voltage. (3) The volt-ampere input varies as the square of the voltage. (4) The power input varies as the square of the impressed voltage. (5) The power-factor is independent of the impressed voltage. (6) The voltage induced in the rotor circuit is proportional to the first power of the impressed voltage.

R. B. Williamson opened the discussion by expressing his appreciation of the author's work. The design of such a motor must be worked out with respect to the minimum torque as well as the average torque. In synchronous motors the squirrel-cage features may be designed for starting, but in induction motors they must be designed for running conditions. The direct-current excitation must not be used untii close to synchronism or the insulation may be broken down. He explained the phenomenon of locking at half speed.

F. D. Newbury considered it desirable to start with the field circuit closed through the total available resistance. In one case of starting a fan, 2.5 normal kilowatt-amperes was required when coming into step, which is as good as an induction motor. He agreed that it is not good to decrease tne air gap.

H. M. Gassman said that the high induced voltage with the laminated type of pole is objectionable. The impedance starter is not as good as the auto-starter.

A. M. Dudley called attention to the need of altering the Standardization Rules, regarding this subject. He also questioned the relation that the total loss in the rotor circuit is equal to the torque.

H. A. Foster referred to solid and laminated poles. The latter should never be open-circuited. Many motors are built with too high initial resistance giving low initial current. The synchronous motor has not been developed to the same point as the induction motor. He agreed that the air gap should not be decreased.

B. G. Lamme said the self-starting synchronous motor is an induction motor until it reaches synchronism and it is a poor one. It could only be made a good one at high expense. The value of the paper is in showing how closely it follows the laws of the induction motor. An induction motor with wound rotor will run loaded at half speed on one phase. The magnetizing turns on a synchronous motor are four or five times as great as on an induction motor. The two conditions are opposed so that the self-starting synchronous machine cannot be the best design for either type.

F. B. Crocker, who was largely instrumental in first having the Standardization Rules framed, agreed that they should be revised occasionally. It is unfortunately true that we cannot make a good combination machine. This paper shows how much alike the two types are.

C. P. Steinmetz said the synchronous motor is superior in its characteristics, especially with reference to power-factor and voltage regulation. It is particularly valuable on transmission lines. The maximum torque is highest as an induction motor. A high torque at standstill requires a high secondary resistance. High torque at synchronism requires low secondary resistance. Shortening the air gap is desirable up to a certain point, as it gives larger starting torque but greater variation with position of rotor. It does not increase the minimum torque unless there is a large number of small slots.

C. J. Fechheimer closed the discussion by answering some of the questions raised. No rigid rule can be given regarding the number of slots, which must be left to the judgment of the designer.

The afternoon session opened with a paper by Brent Wiley entitled "Direct-Current and Alternating-Current Mill Motors for Auxiliary Drives."

The author discussed the very great development in recent years in the motors required for auxiliary purposes in steel mills, and the principal features that are desirable for this type of motor. The various elements of design were studied and the rating and selection of motors discussed. A practical way of determining the necessary rating for a desired service is the root-mean-square method in which the load curve for the given cycle of operation is plotted, the ordinates of this curve squared and the square root of their mean value taken. Typical characteristic curves for various types of motors were given.

A. C. Lanier stated that interpoles were necessary in order to get satisfactory commutation for direct-current motors of this type and over-commutation was often desirable in order to take care of excessive loads. He did not consider the root-mean-square method of rating as always satisfactory.

M. A. Whiting pointed out that the application of the root-mean-square method depends upon the range of efficiency covered by the loads involved. The result might be either too high or too low, according to the shape of the efficiency curve.

R. B. Treat said that motors should be designed for the instantaneous peak of the torque to which they are subject. With a 300-per-cent overload an interpole motor will usually spark worse

than an ordinary motor. Mr. Ahrens answered the point raised by Mr. Treat, telling of a case where commutation was good with a load of 350 per cent.

Gano Dunn pointed out that the rating of the motor depends upon its absorptive capacity for heat, as well as upon the shape of the efficiency curve. He thought that the Standardization Rules of the Institute should contain a provision providing for a root-mean-square rating properly qualified.

F. R. Fishback thought the points brought out in the paper showed that the direct-current series motor was preferable to the alternating-current motor. Mr. Wiley closed the discussion by answering some of the questions which had been raised.

**Electric Braking.**

The next paper was one by H. C. Specht entitled "Electric Braking of Induction Motors."

This paper discussed electric braking by alternating and by direct current. With alternating current it is necessary to reverse the rotating field in the motor. Since double voltage may be induced in the secondary it is necessary that this winding be insulated for double voltage, or that only half voltage be supplied to the primary for braking. The former is preferable on small machines, but the latter on large ones. The various possible methods of connection and the algebraic relations involved were given by the author, along with a number of speed-torque curves for various conditions. Similar data and curves were given for direct-current braking and the following comparison made. The braking torque obtained by alternating current, even with only half primary voltage, is as a rule greater than with direct current. With alternating current the line must be disconnected as soon as the motor comes to a stop, otherwise it will reverse. With direct current it is not necessary to remove excitation. With alternating current the torque can be made more nearly constant during the whole period of braking, whereas with direct current it is difficult to obtain good torque as standstill is approached. The magnetic field for direct-current braking must be much larger, causing a high secondary voltage and a danger of serious potential in case the circuit is broken. The unbalanced pull is also greater. The only advantage of braking with direct current is the small energy needed, which must merely supply the $I^2R$ losses of the primary.

The discussion was opened by H. E. White, who thought that in all such problems the entire outfit should be considered as a whole and not the motor alone. What was really used in many cases was not an electric brake but a reverse-power brake. With a 220-volt alternating-current motor only about four volts direct-current was necessary for braking. It has generally been thought that the direct-current motor was more easily controlled.

H. F. Stratton stated that dynamic braking persists after the current stops, and told of a case of skidding on the rails from a locked armature after the wheels had stopped turning.

Gano Dunn told of experiments showing the same condition as mentioned by Mr. Stratton, and stated that the rotor had even been caused to turn backward from the stored magnetic energy being transformed into mechanical energy. This will occur when the armature is short-circuited through proper values of resistance and reactance.

J. C. Reed told of the difficulty in stopping an elevator at floor levels under variable loads. Good results had been achieved by short-circuiting the armature.

C. S. Lankton referred to a case of alternating-current braking by the use of an extra tap from the transformer. In this case a motor and flywheel could be stopped in 35 seconds as against 3.5 minutes previously. Mr. Specht expressed the opinion that any such outfit should be stopped in ten seconds by the proper application of electric braking.

**Automatic Control.**

A paper was then presented by Stewart C. Coey entitled "Advantages of Automatic Control in Steel-Plant Operation."

The author gave his reasons for prefering automatic control to manual control, and the tests on some new control equipment which had been developed by the use of the series-wound accelerating switch. This device has permitted a great advance in the control of direct-current motors. Due to the fact that most steel-mill work is done on a tonnage basis, the motors are usually driven to the point of breakdown, and moreover it is impossible to get a uniform operation with manual control. Automatic controllers permit maximum acceleration at all times and increase output by lessening the average time spent on the piece of work and by reducing breakdowns. Since one man must usually control several motors, as on blooming mills and cranes, it is impossible to get the best speed with manual control. If overload protection is provided it is usually set for a point much higher than the safety of the motor would warrant. Details of the results obtained by the use of new series accelerating switches were given. The following advantages have been realized by this form of automatic control: (1) reduction in electrical repairs due to cutting down the abuse of motors; (2) reduction in mechanical delays, since the automatic controller saves all of the machinery as well as the motor from excessive power; (3) increased capacity, since the motor works at maximum efficiency at all times and there is less loss of operating time from breakdowns.

H. C. Specht agreed that automatic control might be best for steel mills, but that it was not best in all cases. As a rule more work can be accomplished by this means. It, however, entails complications which may give trouble and cause great loss of time. The use of the series switch has greatly improved automatic control, and if a similar switch could be designed for alternating current, automatic control might become general.

J. C. Reed referred to the interlocking devices for the table controllers. He has been eliminating such devices except for a mechanical interlock on the reversing switch. He did not consider the protection of the motor to be the main consideration. Liberal capacity should be allowed for table motors, and complicated protection can then be omitted.

R. A. Black stated that the main consideration was to get the steel out as fast as possible, and it was necessary to prevent interruption of the work. He had little objection to magnetic control. He had removed the overload device in his mill, where dynamic braking is used. A series switch has eliminated the auxiliary contacts and made it much simpler to locate trouble.

T. E. Tines thought that the overload device for this work should be of the time-limit variety. W. F. Detwiler and others also joined in the discussion, which Mr. Coey then closed.

**Valve Equipment.**

A paper was presented by H. M. Gassman entitled "Motor and Control Equipment of Electrically Operated Valves."

To close large valves quickly they must be operated otherwise than by hand, and as they usually control important service connections it is essential that electrical equipment for this purpose shall be dependable. They should, consequently, be inspected and tried out regularly. The power required to open a valve is a maximum when starting it from its seat. When one-quarter open, little torque is required to complete the operation. On closing, the reverse is the case, but the maximum torque does not reach the value required on opening. To overcome sticking when opening, a lost-motion device is sometimes provided in order to give a hammer blow when starting. Unless provision is made for limiting the torque when closing it is possible to jam the valve, making further operation difficult. A mechanical or electrical indicator should be provided to show the position. A valve should not be over-powered as there is a considerable risk of damaging it. For remote control, the ideal arrangement is one which permits of automatic starting and stopping by simply throwing the switch. Limit switches should be provided at each end of the travel. The one at the closing end will require close adjustment, which should be such that the valve will finally seat itself by the drift of the motor.

H. C. Specht referred to the possibility of jamming the valve, and stated that with alternating current the voltage in the primary can be reduced by an auto-starter.

W. C. Kennedy stated that motors for this work are very often not over five horsepower, and if of the high-resistance type can be thrown directly on the line. To prevent jamming a

limit switch may be used or an overload device inserted in the circuit.

Gano Dunn referred to the standardization and rating of motors for this purpose, for which he had proposed the name "motion motors." He called upon Charles Robbins to know what the Standards Committee had done in regard to this matter. Mr. Robbins stated that the sub-committee having charge of this matter did not approve the name "motion motors," but had been unable to suggest a better one. The committee is not ready to report, but intended to submit ratings for three kinds of duty: continuous, periodic and pulsating.

After a question by Mr. Noner, Mr. Gassman closed the discussion.

**Reversing Rolling Mills.**

K. C. Randall, chairman of the Pittsburgh Section, presided at the session on Friday. The first paper was by B. T. McCormick on "Electrification of a Reversing Mill of the Algoma Steel Company."

The rolls are driven by two 600-volt direct-current motors mounted on the same shaft. Each of these motors has a normal rating of 2,000 horsepower at 75 revolutions per minute, and their armatures are connected in series across 1,200 volts. The current for the motors is supplied by a flywheel motor-generator set consisting of two 1,700-kilowatt 60-volt direct-current generators, with their armatures also connected in series, driven by a 25-cycle, three-phase induction motor of 1,800-horsepower capacity, at 375 revolutions per minute synchronous speed. A 75-ton flywheel serves to equalize the load, so that the power drawn from a 25-cycle line is kept practically constant at a value corresponding to the average power required by the rolling mill motors. As the power demand at the rolls rises and falls, a slip regulator automatically inserts or cuts out resistance in the rotor circuit of the induction motor, thus providing sufficient speed variation of the motor-generator set to enable the flywheel to alternately deliver and absorb energy in such a way as to make the load on the 25-cycle power line practically uniform. When the power demand of the roll motors exceeds the average, the resistance in the rotor of the induction motor is increased. This decreases the speed of the motor-generator set, preventing a rush of current from the alternating-current line, and at the same time allowing the flywheel to give up part of its stored energy to carry the mill motors over the peak load. The speed control and the reversal of the mill motors are effected by varying the voltage impressed upon their armatures through rheostatic control of the fields of the generators. The motors have 16 poles and are of the interpole type. They are also provided with compensating windings in the pole faces of the main poles, in order to reduce the distorting effect of the armature reaction upon the field which would otherwise become quite marked on the peak loads. The yokes are of cast iron, while the main poles and interpoles are of laminated steel punchings. The fields are wound of strip copper on edge in two layers with a duct between to afford an air passage for ventilation. The flywheel is 12 feet in diameter, and is made of cast steel in three pieces, carefully machined on the rim and held together by fitted bolts passing through reamed holes. All of the bearings, both on the motor-generator set and on the mill motors, are self aligning, and provided with water cooling and three distinct methods of lubrication, ring oiling, oil flooding and pressure lubrication. During the period that the set is being brought to full speed, the resistance in the rotor circuit of the induction motor is required to absorb a large amount of energy. In order to dispense with a bulky cast-iron-grid resistance, a special water-cooled resistance was used. This consists of a boiler-iron tank with a water-inlet valve at the top connected to the water mains, and a quick-opening gate valve at the bottom for an outlet. The resistance element is immersed in water and consists of a hollow iron tube of helical form, with the taps for the various starting positions leading out through the top of the case. During the starting period the energy absorbed by the resistance is transferred to the water, after which the hot water can be emptied at the bottom and the tank refilled ready for starting once more. For the purpose of varying the slip of the motor-generator set, cast-iron-grid resistance is used, made up of three steps automatically switched in and out of circuit by slip regulators.

In the discussion, Wilfred Sykes stated that it is no longer necessary to use two separate motors to keep down the inertia, and that tests had shown no advantage of series over parallel collection. European practice is to connect in series, also to increase the size of motors and concentrate the power. There are some units as large as 15,000 horsepower. He considered the overload arrangements inadequate for protection under such conditions as are met in rolling mills. He thought water-cooled resistances might also be used in the slip regulator.

R. A. Black told of grooving the inner edge of a commutator to prevent uneven wear.

R. B. Treat stated that 250 volts had been used in one installation where it was necessary to avoid higher voltages and the design was modified accordingly.

David Hall, H. C. Specht, R. Tschentscher, J. C. Reed and H. W. Cheney also joined in the discussion.

B. T. McCormick, in answer to questions, stated that a continuous shaft was used, without couplings. No blowers were used. The commutator speed was about 3,500 feet per minute.

Wilfred Sykes then presented a paper entitled "Operation of a Large Electrically Driven Reversing Rolling Mill."

The author gave a description of the installation of the Illinois Steel Company, which has been in operation since 1907. The general arrangement and control are similar to that of the Algoma mill. Two motors of 2,000 horsepower each are used, with a maximum speed of 150 revolutions per minute, although 100 is the highest generally used. The flywheel weighs 100 tons. Efficiency curves are given for the mill motor, the generator and the three-phase motor. The performance of the latter has been analyzed with respect to speed, torque and slip regulation. There is also an analysis of the power input for the successive passes in rolling. Various other curves are given.

H. C. Specht raised the question of a three-high versus a two-high mill. The former without reversal is preferable from the electrical point of view and would give higher efficiency.

R. Tschentscher said there was a difference of opinion on this point. A three-high mill will give a larger output of billets but not of plates. The latter are also of better quality from a two-high mill. The preference of steam or electric drive depends largely on local conditions. Data are not available for electrical three-high mills, but where they are steam-driven, no question exists.

E. Friedlaender said that the reversing mill is more used in Europe, where the output from a single mill is more varied. He considered the cost less with electric drive if repairs were not considered, but greater when they were included.

R. A. Black, R. Tschentscher James Farrington and B. T. McCormick also joined in the discussion.

In closing, Wilfred Sykes stated that the two-high mill had a lower efficiency, but the friction loss is less than in a continuous three-high mill, and this gives an advantage in an all-day run. Electrical drive has been found more economical in Europe and is displacing steam drive. In answer to a question he stated the speed of the motor-generator set kept within the limits of 300 and 375 revolutions per minute.

**Hoist Control.**

The session on Saturday morning was called to order at 10 o'clock by Chairman K. C. Randall, with James Farrington, secretary of the Association of Iron and Steel Electrical Engineers, occupying a seat upon the platform. The first paper presented was by H. W. Cheney, and was entitled "Electrical Control of a Large Mine Hoist."

This paper described the motor installation and control for a mine hoist which included a novel control system embodying a liquid rheostat for the control of the hoist motor. A 500-horsepower, three-phase, 25-cycle induction motor is used, with a wound rotor, and air-operated friction clutch. The brakes automatically applied in case current to the motor fails. Details are given of the mine layout and of the electric installation. A limit switch is provided in case

the car passes the desired point of travel. The secondary windings of the motor are connected to the terminals of a liquid rheostat for carrying resistance of the secondary current and controlling the speed.

The liquid rheostat consists of a concrete tank with electrodes of cast iron. The electrolyte, consisting of salt solution, is raised or lowered to vary the resistance. The form of electrodes was carefully worked out to give a smooth speed and accelerating curve. Four electrodes are used, the two outer ones being connected together. At the highest level of the liquid the electrodes are nearly short-circuited. A centrifugal pump circulates the electrolyte from the rheostat tank to a cooling tank. The height of liquid is regulated by means of two movable weirs. The lower ends of the electrodes are always immersed. The tank can be filled in 20 seconds. The weirs are operated by compressed air. The current density at the electrodes is limited to one ampere per square inch for continuous service and three for intermittent service. The results of tests on this apparatus are given, including graphic meter records. The liquid rheostat gives extremely smooth acceleration without jerks, which is not possible with other types of control. It warrants greater attention that it has heretofore received in this country.

M. C. Godspeed read a written discussion by H. E. White, who stated that the liquid rheostat was standard in Europe and was much simpler than magnetic switches. Instantaneous emptying of the tank had been secured by weirs opening on all sides. These were balanced and operated by hand.

Wilfred Sykes stated that the solenoid control of the brake was usual in Europe and had been used since 1900. He referred to an English patent for applying brakes before the limit switch was reached in case the hoist does not slow down at the proper place. He suggested putting electrodes closer together in the liquid controller and interleaving different lengths to secure proper variation of the resistance. Ten amperes per square inch can be used for short intervals where there is forced circulation. He considered sodium carbonate preferable to common salt for electrolyte. He considered the tank very large for the work it had to perform, as a tank two feet square is ample for 1,000 horsepower. For vertical hoists a more rapid emptying is desirable, say, in two seconds. He approved of the manual opening of weirs. With forced circulation two or three times as many watts per cubic inch could be dissipated, as allowed by the author. The specific resistance of the electrolyte is not important.

H. M. Gassman, W. O. Oschmann, F. L. Stone and E. Friedlaender also joined in the discussion. In closing the discussion Mr. Cheney agreed that quick-opening weirs were desirable for some installations, that ten amperes per square inch of electrode was possible for intermittent service, and that the tank could have been smaller. The motor installed was larger than is now necessary, but its full capacity would eventually be required. Concrete was used for the tank only because it was constructed as a part of the building. The slip should be reduced by an extra switch, short-circuiting the liquid rheostat

### Unloading Coal.

A paper by W. N. Ryerson and J. B. Crane entitled "Notes on the Use of Alternating Current in Unloading Coal" was then presented by Mr. Crane.

The authors advocated the use of alternating current for various types of apparatus used in unloading coal at the dock. Several installations on Lake Superior were described, including the bridge tramway, the cable car, and the man trolley. A comparison of the different types was made. The friction type of brake is most reliable and economical. Dynamic braking is more expensive but is satisfactory with trained operators. Alternating-current magnetic control gives the least trouble and is the simplest to operate and maintain. 440-volt distribution is considered the most satisfactory, as high voltage, though cheaper, has given trouble due to flashovers on the insulators, which become covered with coal dust. Graphic wattmeter records were given for the various types of apparatus. The rates charged for central-station service for this purose are as follows: $1.00 per month for each kilowatt of rating, 1.1 cent per kilowatt-hour for energy up to 70 kilowatt-hours per month, for each kilowatt of rating; 0.5 cent per kilowatt-hour for all additional energy. The rating of the load is the maximum rate at which power is used, as shown by curve-drawing meters, determined by the highest of any of the following: 40 per cent of the maximum instantaneous peak, 50 per cent of the maximum one-minute peak, 66.7 per cent of the maximum three-minute peak, or the maximum five-minute peak. Any such rating holds until a greater peak is obtained. 40 per cent of the instantaneous peak is found to give usually the highest maximum. The use of alternating current for this service has proved commercially successful, and it is expected that the majority of new installations at this point will be of the same character.

Wilfred Sykes, in discussing the paper, stated that dynamic braking had come into use because mechanical brakes were inadequate. It greatly facilitates rapid operation and requires less energy on the part of the operator. The cost in one installation was about 50 cents per day. Compressed air is needed for clutches, and consequently was used also for the switches. He pointed out that the peaks of power required for the hoists and the trolley would often overlap. He considered the man trolley the most desirable form of bridge. The breaking of coal is less and the capacity may be large. The latest equipment of this kind is for direct current, with the idea of securing greater reliability, but he did not think it was justified. A motor-generator set is required.

Thomas S. Henderson said that the direct-current installation referred to is being put in by a company already having alternating-current equipment. The latter is not satisfactory unless the voltage can be maintained at normal, since the torque varies as the square of the voltage. Dynamic braking had not been properly appreciated in the Northwest. Direct current was best for this purpose. In the latest installation there was series-parallel operation of the trolley. The parallel connection cannot be switched in until the hoist is complete, which prevents overlapping of the peaks. There are two other installations of direct current about to be installed in the same territory. The coal docks are just beginning to realize the advantages of series motors, electric braking, etc., as established in ore-handling practice. The energy for handling coke in Milwaukee is only 0.47 kilowatt-hour per ton for both control and bridge. In one job where the bridge was hardly moved, 6,000 tons were moved at a cost of 0.25 kilowatt-hour per ton. For one concern the average value for the complete handling is 0.58 kilowatt-hour per ton.

R. N. Selleck considered that alternating current was only a makeshift for coal or ore handling, and does not lend itself readily to dynamic braking. Speed is a great consideration in this work, and for cheapness the weight on the bridge is also important. Estimates on various designs for one installation have shown the following as the order of cheapness for different voltages: 600 D. C., 250 D. C., 440 A. C., 13,200 A. C. The use of electric clutches with direct current is satisfactory. Regulation has been found good, and the torque does not fall enough to make any trouble. The class of operators on this work is not very high, and all complications in the handling are undesirable.

R. E. Hellmund stated that alternating current will do all that is necessary in dynamic braking down to three-percent speed. The difference in weight between the two systems is being greatly reduced.

E. Friedlaender and Albert Kingsbury made some brief remarks, and Mr. Crane then closed the discussion. He called attention to the low expense for brake-shoes, and the fact that no compressed air was used on the alternating-current bridge. One concern, which is now using this, would not think of having anything else. He referred to the troubles with the curve-drawing wattmeters, which would overshoot on the peak. A printing attachment to a watt-hour meter had also been tried. Direct current was being used on the one installation referred to because the owner was inherently op-

posed to the use of alternating current in general, and the other installations of direct current were due to the fact that direct current was already in use at those docks. Two installations of alternating current would be completed this year, which are as large as any now built. The figure of 1.76 kilowatt-hours per ton, which was given in the paper, included all operations on the dock, including screening, etc. The unloading alone required from 0.35 to 0.6 kilowatt-hour per ton. The 13,000-volt installation had been found cheaper than the others, and the only fatality due to this resulted from a man, who had gotten on top of a shed, touching a live wire. He referred to the briqueting of coal dust, which was being carried out and which raised the value of the dust from $1.90 to $4.00 per ton.

**Central-Station Power for Coal Mines.**

The last paper of the meeting was one by Graham Bright entitled "Does It Pay the Average Coal Mine to Purchase Central-Station Power?"

This paper discussed the advantages and disadvantages of the isolated plant and central-station power for supplying coal mines. Detail costs were figured out for conditions in a typical mine and the saving of central-station power shown for various assumed rates of charge. The following reasons were given to prove the advisability of purchasing central-station energy: (1) lower cost of operation; (2) care of power plant removed; (3) greater reliability; (4) less expense involved in shutting down; (5) release of capital for other work; (6) greatly increased output with small increase in capital; (7) increase of production on account of increased efficiency; (8) greater constancy in speed of fans and pumps.

The discussion was opened by E. D. Dreyfus, who stated that circumstances greatly influenced the desirability of central-station service. He gave figures to show the difference in cost under other circumstances. Test results are usually not reached in practice because the mechanical end is not up to the electrical end. Energy from a central source usually gives a definite cost. Most managers do not know the costs in their own plants.

G. R. Wood did not consider the cost of power the only consideration. The saving in power might be only one cent per ton when the total saving might reach five cents, due to better conditions, steadier voltage, etc. Line losses from old direct-current stations at the mouth of the mine sometimes amount to 40 per cent. He cited one case where 11 cents per ton had been saved by using central-station power, and there were less repairs in addition.

H. M. Gassman thought a mining load good for a central station, since it is usually a day load. He considered a disadvantage of central-station supply to consist of loss in the distribution line and the danger of interruption. From the figures given by Mr. Bright there will be no gain if the interruption should total seven days in a year. He favored supplementary power from central stations in the case of old mines and the retention of the old equipment. Its salvage value was not as great as its value as spare equipment. It could also be used for increased power in the wet season. The advisability of central-station power for new mines depended upon the local conditions.

E. T. Penrose questioned whether there was any advantage in central-station power where a group of mines could be operated from one plant. The cost of power depends largely upon load-factor, and this was probably better on a large system of mines than at the average central station. Load-factor for such a group of mines should be about 30 per cent. Obstacles to the development of power by the mines are lack of expert management and the lack of good water. Often 15 to 35 pounds of coal were burned per kilowatt-hour whereas a good central station consumes only three or four pounds.

Wilfred Sykes stated that in the case of one large central station supplying two counties the interruptions only amounted to 0.02 per cent of the time. He stated that there were a number of central stations now being built principally to supply the mines.

W. N. Ryerson called attention to one great advantage in central-station power which was the ability to operate part of the equipment without running the entire plant. Reliability was a strong factor, and its existence was evidenced by meeting the Underwriters' rules for fire pumps.

Joseph McKinley asked a few questions, and Mr. Bright then closed the discussion, and the meeting adjourned.

## Examination for Electrician in the Bureau of Standards.

The United States Civil Service Commission announces that on May 22 an examination will be held for the position of electrician in the Bureau of Standards, Washington, D. C., and vacancies requiring similar qualifications as they may occur. The salary is $900 a year and applicants must be at least 20 years of age.

It is desired to secure a competent electrician, qualified in the care, maintenance, and repair of station storage batteries, and skilled in lead burning as applied to such batteries. It is also desired that the appointee shall have had experience as an interior wireman.

Applicants should apply either to the United States Civil Service Commission, Washington, D. C., or to the Secretary of the Board of Examiners for application and examination Form 1800.

## PACIFIC COAST MEETING, AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

**Portland, Ore., April 16 to 20.**

The morning of Tuesday, April 16, saw the commencement of the third Pacific Coast convention and the two hundred and seventy-first meeting of the American Institute of Electrical Engineers. The headquarters were at the Hotel Multnomah, Portland, Ore. At 9 a. m. registration of visiting and resident members and their friends commenced. Before the close of the meeting the total registration was 240. At 11:30, F. D. Weber, chairman of the Portland Section, in a few well chosen words declared the convention open and introduced S. G. McMeen, president of the Mount Hood Railway & Power Company, who in a brief but interesting address welcomed all to Portland and the convention. Gano Dunn, of New York, president of the Institute, responded eloquently, expressing his great pleasure at being able to be present. He spoke of the great development of the engineering profession, and referred especially to the progress on the Pacific Coast.

The afternoon session commenced at 2 o'clock with Mr. Dunn in the chair. A. A. Miller, of Seattle, Wash., read the first paper, that on "Arc vs. Tungsten Lighting for Small Towns," which was prepared by C. E. Stephens. This paper brought forth some very interesting discussion, those participating therein being Messrs. Lindsay, Murphy, Miller, Dunn, Hall, Cooley, Hillebrand, Howes, Sampson, Fisken, Martin, Coldwell, Gilbert, Jones and Cramer.

Immediately following this paper was one presented by L. J. Corbett, of the University of Idaho, on "Irrigation in the Spokane Valley." This paper was ably discussed by the Messrs. Fisken, Miller, King, Anderson, Hillebrand, Dunn and Howes. While in the midst of the discussion on Mr. Corbett's paper, R. W. Pope, of New York, the honorary secretary of the Institute, who had been unavoidably detained in California, arrived and was given an enthusiastic welcome by the convention.

During the afternoon, while the papers were being presented and discussed, the visiting ladies were given a "Seeing Portland" trip in special cars provided for them. At 6:30 p. m. there was an informal dinner given in the Hotel Multnomah in honor of the visiting members and ladies; 124 members and guests were present. A most enjoyable evening was spent and all were loud in their praise of the first day's proceedings.

On Wednesday the morning session

commenced at 9:40, with S. G. McMeen in the chair. Gerald Deakin, of San Francisco, Cal., read a paper on "Automatic Private-Branch-Exchange Development in San Francisco." This paper brought forth considerable discussion by Messrs. Friendly, Griswold, Fullerton, Pope, Dyson and Burghduff. The general trend of the discussion was towards the early adoption of the automatic system for long-distance communication as well as private-branch-exchange service.

The next paper was presented by A. H. Dyson, of Chicago, on the "Application of Automatic Selecting Devices to Telephone Multiple Switchboards." After the presentation of this paper Mr. McMeen was obliged to leave, so he called A. H. Griswold, of San Francisco, to the chair. Taking part in the discussion of Mr. Dyson's paper were Messrs. Deakin, Fullerton, Griswold, Peaslee and Friendly. At 11:35 a. m. Mr. Dyson closed the discussion and Mr. Griswold caled Mr. Dunn to the chair, as he (Mr. Griswold) was to present the next paper.

After a short intermission, Mr. Dunn called on Mr. Griswold to present his paper on "The Design of Telephone Pole Lines for Conditions West of the Rocky Mountains." Mr. Griswold's paper, and the discussion that followed, brought out many interesting points. Messrs. Hall, Deakin, Peaslee, Fullerton, Downing, Lisberger, Babcock and Griswold took part in the discussion.

In the afternoon, at 2:30, the visiting and local members and ladies embarked for an excursion on the steamer *Undine*. The steamer first headed down the river, and the visitors had pointed out to them the various features of interest as seen from the harbor. The boat was then headed upstream, and made its first stop at station L of the Portland Railway, Light & Power Company. Here all of the party disembarked and spent an interesting half-hour oking through the station from top to bottom. The trip was then continued up the Willamette to the Willamette Falls at Oregon City, a distance of 12 miles from Portland. Here the party witnessed the capture of several game salmon. Only a few minutes was spent here and the boat then started on the return trip to Portland. An incident of the return trip was the grounding of the steamer on a shoal not far from Oregon City. However, no inconvenience was suffered, as launches were secured to convey the party to Oregon City, and the return trip to Portland was made by electric cars. This ended the second day's program.

On Thursday the morning session was called to order at 9:30 by Mr. Dunn. J. W. Welsh, of Pittsburgh, Pa., read a paper on "Operation of Two Alternating-Current Stations Through Parallel Circuits and the Distribution of the Load and Wattless Current Between Them." The following named gentlemen took part in the discussion of this paper: Messrs. Lyon (by letter), Hall, Downing, Carpenter, Hillebrand, Miller, Howes and Welsh. Mr. Dunn then requested P. M. Downing, of San Francisco, to take the chair.

J. D. Ross, of Seattle, then presented a paper on "Plant Efficiency." This was followed by a lively discussion from Messrs. Dunn, Lisberger, Howes, Fisken, Harza, Coldwell, Hall and Ross.

J. E. McDonald, of Los Angeles, Cal., read a paper on "Practical Joint Pole Construction." Mr. McDonald illustrated the paper by lantern slides. The following named gentlemen took part in discussion of this paper: Messrs. Downing, Griswold, Cramer, Dunn, Coldwell, Lisberger, Wakeman, Fisken and McDonald.

Promptly at 2:30 p. m. Dunn called the afternoon session to order and introduced O. B. Coldwell, of Portland, Ore., who presented a paper on "Principles to be Considered in Selecting a Water-Wheel Unit." Mr. Coldwell's paper was followed by discussion by Messrs. Dunn, Hall, Shepard, Ross, Babcock, Allen, Smith and Coldwell.

At this point Mr. Dunn requested Mr. Miller of Seattle, to take the chair. Mr. Lisberger, of San Francisco, presented a paper on "Alternating-Current Systems of Underground Distribution," by S. J. Lisberger and C. J. Wilson. This paper was immediately followed by another on "An Underground System and a Few Developments," by S. B. Clark, of Portland. Discussion of both papers was taken up together and was participated in by Messrs. Wakeman, Clark, Fisken, Allen, Lindsay, Welsh, Sampson and Weber.

The evening session was opened at 8:30 by Mr. Dunn, who after a short opening address called A. H. Babcock, of San Francisco, to give his talk on the "Operation of the 1,200-Volt Volt System of the Southern Pacific Company." Mr. Babcock's talk was highly interesting and was well illustrated by lantern slides. Mr. Babcock concluded his talk at 10:10 p. m. Mr. Weber then read a few announcements and called on O. B. Coldwell, who in a few words on behalf of the Portland Section of the Institute, presented President Gano Dunn with a beautiful loving cup. Mr. Dunn was taken completely by surprise, but most fittingly and feelingly responded. He spoke of the pleasure and benefit he himself had derived from being present, and of the great success of the convention. Mr. Dunn declared closed the technical phase of the convention at 10:30 p. m.

While the gentlemen and several of the ladies were attending the meeting Thursday evening, the remainder of the visiting ladies were being entertained at a theater party at the Heilig.

At 9:15 a. m. on Friday 170 of the members and ladies left Portland in special electric cars. The first stop was made at the River Mill development of the Portland Railway, Light & Power Company. This is the newest hydroelectric development of the Portland Railway, Light & Power Company and was very thoroughly inspected. The trip was then continued to Estacada, where half of the party left the train and was entertained at luncheon at the Estacada Hotel. The other half was taken on to the Cazadero development of the same Portland company. About an hour was spent here and the return trip was made to Estacada. Here those who had had luncheon now boarded the cars and were taken to Cazadero, while those who had already been through that plant, were in turn entertained at luncheon. It had been the intention to visit the new high-head plant of the Mount Hood Railway & Power Company, at Bull Run, on Friday afternoon, but owing to more time having been taken than anticipated in looking over the two previously mentioned plants, it was decided to postpone the Bull Run part of the trip till Saturday. Portland was reached at 5:30 p. m. This ended the official program for Friday.

Saturday was spent in visiting the hydroelectric plant of the Mount Hood Railway & Power Company at Bull Run, the various steam generating plants and substations of the Portland Railway, Light & Power Company and the Mount Hood Railway & Power Company, the Home automatic telephone exchanges, the Portland Trades School, and many other points of interest in and around Portland.

During the entire convention models representing electric rates in the cities of the West by the system of three-dimensional diagrams, w e hown and explained by H. E. Eisenmenger, of Cleveland, O.

Saturday night saw the conclusion of the convention, and the feeling of those present was well expressed by President Dunn when he said: "The meeting has been one of the most educational and most entertaining of this body I have ever attended. It was a great success."

## Exports of Copper.

Copper exports for the week ending April 25 totaled 5,752 tons; since April 1, 19,018 tons; same period last year, 27,037 tons.

## SOUTHWESTERN ELECTRICAL AND GAS ASSOCIATION.

### Annual Convention in San Antonio, Tex., April 25-27.

At San Antonio, Tex., April 25, 26 and 27, the Southwestern Electrical and Gas Association held its eighth annual convention. The headquarters were at the St. Anthony Hotel, where the meetings were also held. Over 300 representatives of member companies and supply men were in attendance. The beautiful ball-room of the St. Anthony Hotel was used by the associate members for their respective exhibits.

J. E. Carroll, of Beaumont, president of the Association, called the convention to order on Thursday morning. J. H. Kirkpatrick of San Antonio, delivered the address of welcome, which was very cleverly responded to by R. N. Graham, of the Houston Electric Company. A number of new members were elected, making a total membership of a little over three hundred.

In his annual address President Carroll said:

Several of our presidents in the past have had something to say along the line of keeping in touch with the public by being frank and honest with them, and keeping them posted on what you are doing and trying to do. It is good advice, and I do not know of any better way of carrying out the suggestion than in making use of our newspapers. Take liberal space with them and you will find it a very effective way of not only bringing any specialty that you have for sale before the public, but affording an opportunity of educating them at the same time how to appreciate the opportunities offered by the various public-service utilities. If by this or any other means we are able to make the public realize how much the public-service corporations have added to the value of their property, they will not be so prone to find fault, or kick at the least disturbance in service. We have had too much of the wrong kind of legislation and not enough of the right kind. I think that we should ask for a law that will in some measure suppress the damage-suit lawyer. In some states there are laws that fix a maximum amount for any given injury; at the same time fixing a limit for the contingent fee to be charged by attorneys representing the claim. Some of our public carriers in this state have paid as much as fifteen per cent of their gross receipts for damage claims during the past year. While we owe it to our employees, and to the public as well, to use every known safety appliance, and operate with all precaution practicable, yet the demand for rapid transportation has made it impossible to operate and eliminate accidents altogether.

The President closed his address by recommending the employment of a permanent secretary. The remainder of the morning session was devoted to the reading and discussion of a paper entitled "Prepay Meters: Their Advantages and Disadvantages," by George M. Griffith, of the Galveston Gas Company.

At the afternoon session T. C. Brown, general superintendent of transportation of the San Antonio Traction Company gave an interesting talk on the "History of Street-Railway Development in Texas," as the first address of the afternoon session. Mr. Brown had on exhibit one of the strap rails and a frog that were used in San Antonio in the days when mules were the motive force, and in his address he emphasized the importance of the development of trainmen as one of the most essential features of progress. C. O. Burney, of Stone & Webster, followed Mr. Brown with a number of very interesting suggestions in regard to the most recent characteristics in the design and construction of city and interurban cars.

A paper was then presented by A. D. Brinkerhoff, assistant superintendent of the Waco Electric & Gas Company, entitled "A Treatise on the Distribution of Electricity from the Central Station."

The writer first gave a sketch of the fundamental features of construction, together with some statistical matter. Beginning at the generating station, the first link in the chain of alternating-current distribution is the high-potential feeder. Feeders are either single or polyphase. Power for polyphase motors is, of course, transmitted by means of polyphase feeders, and it is the policy of some companies to run lighting feeders three-wire, three-phase, to the center of distribution and there branch off with two-wire, single-phase circuits. This effects a saving in copper of 25 per cent over the two-wire, single-phase method, but somewhat complicates the loading and maintenance of these circuits and the balancing of the various phases. It is desirable to have a number of feeders leading from the plant, one for each section of the territory served, so that trouble in one section may only affect that feeder and its controlling switches and not disturb the other sections. The carrying capacity of alternating-current feeders is limited by the inductive drop. In 60-cycle work it is very rare that feeders carrying over 100 amperes per wire are used. The drop occasioned by a number of wires carrying a certain current is materially less than that caused by one wire of a cross-section equal to the combined wires. Since in cities of any considerable size there is sure to be more or less agitation in the future in the matter of running wires underground in the business section, at least, it is well in designing residence feeders to locate them, if possible, so that they will avoid running through the business district. This will also reduce the risk of damage by fire and the consequent interruption in service, which is even more important. Feeders should be carried as near as possible to the electrical center of gravity of the section to be served, before any transformers or primary branches are connected to them. This will insure the greatest possible uniformity in voltage throughout the territory served. Each branch feeder and transformer should be controlled by a junction fuse, so that trouble in any particular section will not disturb the other branches, nor the main feeder. Pole lines, both of main and branch feeders, wherever possible, should be run in alleys. This minimizes the possibility of accidents from falling wires, and makes the installation of service wires more convenient and economical. It is much the better practice to use large transformers wherever possible. This requires more secondary wire, which will tend to offset the saving effected by the reduction in the cost per kilowatt. But the decrease in core loss and increase in useful capacity due to the diversity-factor of a larger connected load, will usually justify the use of the larger transformer.

In a paper by Frank A. White, Amarillo Water, Light & Power Company, on "The Relation of Power-Factor to Central-Station Costs," reference was made to devising an equitable system of rates which in the discussion of the paper brought out an interesting point in regard to public policy. C. W. Kellogg, Jr., of El Paso, opened the discussion by saying that we have already gone too far in figuring out why rates should vary and that we should turn our attention now to figuring out ways to keep our rates uniform and make them reasonably simple and satisfactory. H. S. Cooper followed Mr. Kellogg and pointed out the apparent weakness in the business methods adopted by central stations. No other business tries to make a profit on every single item. We have left the old idea of taking the general average of our business and making it pay as a whole and are trying to force against unnatural and unbusinesslike conditions a profit from every kilowatt of current sold. That is an impossibility because we cannot store our product; and, with reference to the power-factor, we have been trying to differentiate our costs in such a way as to make the public pay for every disadvantage we have, which we cannot do.

This closed the regular program, and the remainder of the afternoon was devoted to a discussion of the Street Railway Section of the Question Box.

The Friday-morning session opened with "The Benefit of the Interurban to the Community," by R. B. Stichter, of the Texas Traction Company.

The Question Box was then taken up and the question "What success have you had in burning slack coal and lignite with stokers?" proved to be of principal interest. C. W. Kellogg, of the El Paso Electric Railway Company, opened the discussion by stating that with the use of chain-grate stokers the slack coal from the New Mexico mine run could be burned smokelessly and

with economy. The coal from which the slack was made was a coking coal. A number of the members gave their experiences with Texas lignite and A. E. Judge was a particularly strong advocate of the use of Texas lignite as more economical than oil. The principal difficulty mentioned by any of those who discussed the question was the increased labor cost. There seems to be quite a general difference of opinion at the present time with reference to the general use of Texas lignite.

At the Friday-afternoon session H. L. Geise read a paper on "Theft of Electric Current and Gas," which was an interesting compilation of the laws of the country, dealing with the decisions, opinions, kind of evidence, character of proof and the statutes of the various states with reference to theft of current, gas and water. The stealing has been a great annoyance to public-service corporations and under the present laws it is necessary to have eye witnesses to the stealing, diverting or attempting to divert gas, current or water. An effort is being made to have laws passed placing the responsibility of the meter upon the occupant of the premises, and when that is put into effect it is believed that a very positive step will have been taken to stop stealing of this character.

The most popular paper at the convention was that presented by C. W. Kellogg, Jr., manager of the El Paso Street Railway Company, on "The Relations that Should Exist Between the Public and Public-Service Corporations."

The rapid growth of the public-service business in the last dozen years, involving the solving of many technical problems, has tended to give the technical man the whip hand, and to suggest that the mass of technicality necessitated the highest degree of trained skill for the management of the public-service properties—the obvious inference having been that the beginning and end of the public-service business was embraced in the showing of the Tirrell regulator and the per cent of bad debts, not to mention load-factors, etc., which the public could never be able to grasp. This frame of mind had as much as anything else to do with the disregard of public opinion which largely prevailed until a few years ago. In recent years managers have come to realize that, while many of the public service problems were technical and new, yet the fundamental ones were as old as the hills; and the same underlying principles govern the sale of transportation, gas and electricity as the sale of food and clothing. What the public want is good service cheerfully furnished. The ordinary man wants clean, neat street cars, on a reasonable schedule, with polite men operating them. He does not care particularly about the kilowatt-hours per car-mile. He may know nothing about the per cent of daylight, the pounds of water per pound of fuel, or other weighty matters affecting a lighting company, but he is very much alive to the size of his bills and the failure of his lights while he was having some neighbors in to dine with him. The company which fails to bear in mind the customer's point of view will never be successful, for the public is simply the customer multiplied by the thousand. Every customer who gets a patient hearing and full investigation or explanation, as the case may be, is one small asset added to the public good will of the company. There is no reason why we should make the mistake of ignoring these chances for contact with the public if we stop to think that our whole business is the integral of numerous small quantities. It is important to get the public point of view. The average man knows nothing specific about the company's organization or lines of responsibility, and feels that when he is doing business with an employee of the company he is doing business with the company. Legally and practically he is absolutely right in that feeling, and it is the duty of the company to see to it that each one of its employees properly represents the views and policy of the company in its relations with the public. The failure of public-service managements to grasp and act on that fact has been the cause of much public hostility towards public-utility companies. What good does it do for the manager of the company to be just and courteous if the meter man tracks in mud when he reads the meter, or the line gang ruthlessly cuts down the shade trees in front of someone's house. Even in semi-technical matters the public's point of view can profitably be borne in mind. Your customer is more interested in prompt answering of trouble calls than in the nature of the Meter Department card systems; and clean windows and well painted cars create more public enthusiasm than the latest thing in maximum traction trucks. As to specific ways and means of getting into proper touch with the public, the following general principles carefully followed will greatly strengthen any public situation: (1) Make personal politeness, self control and tact an absolute requirement of every employee of the company. (2) Meet every issue raised by the public promptly, fairly, and fully. (3) Adopt as a general principle of action the famous saying of Marshall Field, of Chicago, that "Every customer in my store is right." By admitting the customer's point of view from the start, it is much easier to get him to later adopt the company's view, if investigation shows the latter to be correct. (4) make access to the company for information or complaints as easy and direct as possible, and have as few service requirements as possible. The public hates to see the red tape sticking out. (5) Make the operation of the policies of keeping friendly with the public continuous.

The remainder of the afternoon session was turned over to the supply men and the idea met with such favorable response that the members of the Association authorized the recommendation of a Supply Men's Section, whose duty it should be to have charge of the exhibits and the arrangement for exhibits at the convention, and to have representation on the program to the extent of one-half-day's meeting.

At the session on Saturday morning, the Association authorized the employment of a permanent secretary who should devote his entire time to the interest of the Association, and the assessment of the member companies on the basis of their gross receipts, the least assessment to be five dollars. The selection of a secretary was left in the hands of the Executive Committee, as was also the selection of the next place of meeting. It is likely that either Galveston or Fort Worth will be the next place of meeting. The following officers were elected: President, Fred M. Lege, Jr., Galveston; first vice-president, D. G. Fisher, Dallas; second vice-president, G. H. Clifford, Fort Worth; third vice-president, W. L. Wood, Jr., Texarkana; treasurer, A. E. Judge, Tyler.

**Entertainment.**

A reception was given the delegates to the convention by the supply men in the beautiful ball room of the St. Anthony Hotel on Thursday evening, and on Friday evening a grand rejuvenation of the Sons of Jove was held including a parade, initiation of about forty candidates and a smoker.

Exhibits were made by the following: Tool Steel Gear & Pinion Company, Cincinnati, O.; Wagner Electric Manufacturing Company, Dallas, Tex.; Atlas Railway Supply Company, Chicago, Ill.; General Electric Company, of Dallas, Texas; Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.; Tel-Electric Company, Houston, Tex.; Crouse-Hinds Company, Chicago, Ill.; Electric Service Supplies Company, Chicago and Philadelphia; Ohio Brass Company, Mansfield, O.; Century Electric Company, St. Louis, Mo.; Buckeye Electric Company, St. Louis, Mo.; Goldschmidt Thermit Company, New York, N. Y.

## Electric Vehicle Association of America.

A monthly meeting of the Electric Vehicle Association of America was held in the Engineering Societies Building, New York City, on the evening of April 23. Charles A. Ward presented a paper, illustrated with lantern slides, on "The Electric Vehicle Fleet of the Ward Baking Company, New York." This company operates 100 1,000-pound electric wagons in the borough of the Bronx and 100 similar wagons with 30 1,500-pound electrics in Brooklyn. All these were made by the Ward Motor Vehicle Company. Mr. Ward's paper described the cars, the garage or shipping department in the Bronx plant, the operating equipment, the garage-organization scheme, the system of record cards employed and the cost data obtained by the use of these cards.

# Iowa Electrical Association.

## Twelfth Annual Convention, Des Moines, Ia., April 24 and 25.

The twelfth annual convention of the Iowa Electrical Association, held in Des Moines, Ia., April 24 and 25, brought to a close one of the most successful years in the history of the Association. Under the able administration of President Blackwell and Secretary Zahm the membership of the Association was increased by 15 companies, the finances greatly improved and an excellent program arranged for the Des Moines convention.

One of the most important features of the meeting was the action of the Association in voting in favor of affiliation with the National Electric Light Association. Several constitutional amendments must be made in order to have the Iowa constitution conform to the National requirements but these will be effected before the Seattle convention.

The meeting was called to order at 10 a. m. on Wednesday by President Blackwell. Mack Olson, of the Greater Des Moines Committee, welcomed the delegates to the city in an address in which he described the ornamental street-lighting system of the business district. The Greater Des Moines Committee, appreciating the advertising value of such lighting, took the initiative in a campaign for it and had a city ordinance drawn up and a set of plans prepared specifying all details of the system. Posts are equipped with five 100-watt tungsten lamps four down turned and the center lamp upturned. Posts are spaced 56 feet apart. The Committee solicited subscriptions from merchants and property owners, the initial cost per post being $155 and the yearly maintenance cost $66. There are at present 660 posts installed. The merchants have, so far, paid entire cost and maintenance, but is expected that arrangements will be completed whereby the city will pay the cost of burning the center lamp from dusk to daylight. At present all lamps are lighted from dusk to midnight, at which time the city arcs are lighted.

George S. Carson, of Iowa City, responded to the welcome extended by Mr. Olson, pointing out how central-station companies aid in the upbuilding of a community in which they operate. He touched briefly on the subject of relations between public utilities and the public and the question of rates and regulation. Central stations, he said, obtain gross receipts approximating one-sixth of the capital invested while the average businesses have gross receipts totaling five or six times the capital invested.

The address of President Blackwell was next in order. Some significant developments of the past year were referred to, the most important being the improvement in the incandescent lamps and the reduction in prices; the development in long-distance transmission, making possible the development of farm business; the increased co-operation of the manufacturers in promoting sales and in development of new appliances and new business; the tendency toward centralization of power generation and management as evidenced by the recent absorption of smaller properties by larger ones; and finally the regulation of public utilities by state commissions. The address of Mr. Blackwell was referred to a committee for consideration.

The report of the Committee on Grounded Secondaries was then presented by Prof. T. A. Fish, of Ames. This is a continuation of a report which the Iowa Association, with the co-operation of the state university and college, has been carrying on for several years. Results of tests as reported by Professor Fish are given in the accompanying table.

All grounds in earth are buried six feet and show a lower resistance than grounds in charcoal.

Prof. A. H. Ford, of Iowa City, commented briefly on the tests made at the state university. Plain galvanized pipe buried in earth makes the best ground.

The report of the Committee on Facts and Factors was called for but Austin Burt, of Waterloo, chairman, reported that the lack of co-operation of members in sending the desired information made it impossible to compile sufficient data to present a creditable report. Of 148 blanks requesting information sent out, only 22 replied and several of these gave only partial information.

The Committee on Affiliation with the National Electric Light Association, of which Austin Burt was chairman, then presented its report, advocating affiliation and giving all details regarding dues, membership classification, etc., of the National Association.

A. W. Zahm as chairman of the Committee on Street-Lighting Statistics then presented his report which comprised detailed statistics on arc and incandescent street lighting in a majority of the Iowa towns. The data show that there are only 11 stations in Iowa operating the lights all night every night. These 11 stations receive an average price of $69 per lamp per year, which covers a total of 1,972 arc lamps out of a total of 3,067 lamps, or nearly two-thirds of the total number.

TABLE OF GROUND RESISTANCES—1911-1912.
**Summary of Results at Ames.**

| | Description | Sample No. 1 | | | Sample No. 2 | | |
|---|---|---|---|---|---|---|---|
| | | Max. | Min. | Mean of 26 Readings | Max. | Min. | Mean of 26 Readings |
| 1 | Iron in Earth..... | 10.75 | 6.35 | 8.46 | 8.78 | 5.52 | 7.24 |
| 2 | Iron in Charcoal..... | 10.14 | 6.67 | 8.52 | 11.08 | 6.95 | 8.96 |
| 3 | Copper in Earth..... | 8.50 | 4.91 | 6.82 | 8.59 | 5.04 | 6.90 |
| 4 | Copper in Charcoal..... | 11.84 | 6.73 | 8.82 | 11.69 | 6.83 | 8.68 |
| 5 | Aluminum in Earth..... | 11.28 | 7.07 | 9.59 | 11.75 | 7.53 | 9.55 |
| 6 | Aluminum in Charcoal... | 16.50 | 9.50 | 12.17 | 16.17 | 9.40 | 12.39 |
| 7 | Garton-Daniels, Earth.... | 9.67 | 6.58 | 8.29 | 10.94 | 7.04 | 8.83 |
| 8 | Garton Daniels, Charcoal. | ..... | ..... | ..... | ..... | ..... | ..... |
| 9 | 1.5" Pipe— 6' Earth ..... | 10.83 | 7.80 | 9.37 | 9.88 | 6.82 | 8.55 |
| 10 | 1.5" Pipe— 6' Charcoal .. | 24.62 | 12.04 | 16.90 | 13.22 | 7.82 | 10.34 |
| 11 | 1.5" Pipe— 3' Earth ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 12 | 1.5" Pipe—10' Earth ..... | 9.39 | 5.97 | 7.99 | 8.02 | 5.40 | 6.79 |
| 13 | 1.0" Pipe—15' Earth ..... | 11.03 | 6.58 | 8.63 | 9.11 | 5.96 | 7.27 |
| 14 | Paragon Cones—Earth.... | 15.40 | 8.83 | 12.14 | 17.91 | 10.20 | 13.12 |
| 15 | Paragon Cones—Charcoal. | 14.90 | 8.21 | 10.97 | 12.70 | 7.18 | 9.73 |

| | Description | 1911 | | Averages | | | Ratios | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Rel. to 1.5" Pipe | 1909 | 1910 | 1911 | 1909 1909 | 1910 1909 | 1911 1909 |
| 1 | Iron in Earth..... | 7.85 | 1.06 | 7.71 | 9.9 | 7.85 | 1.00 | 1.28 | 1.02 |
| 2 | Iron in Charcoal..... | 8.74 | 1.18 | 8.31 | 12.9 | 8.74 | 1.00 | 1.55 | 1.05 |
| 3 | Copper in Earth..... | 6.86 | 0.93 | 7.60 | 8.6 | 6.86 | 1.00 | 1.13 | 0.90 |
| 4 | Copper in Charcoal..... | 8.75 | 1.18 | 8.50 | 19.6 | 8.75 | 1.00 | 2.31 | 1.03 |
| 5 | Aluminum in Earth..... | 9.57 | 1.29 | 8.16 | 11.3 | 9.57 | 1.00 | 1.39 | 1.17 |
| 6 | Aluminum in Charcoal... | 12.28 | 1.66 | 8.80 | 34.8 | 12.28 | 1.00 | 3.96 | 1.40 |
| 7 | Garton-Daniels, Earth.... | 8.56 | 1.16 | 7.52 | 13.0 | 8.56 | 1.00 | 1.73 | 1.14 |
| 8 | Garton-Daniels, Charcoal.. | ..... | ..... | 11.73 | ..... | ..... | 1.00 | ..... | ..... |
| 9 | 1.5" Pipe— 6' Earth ..... | 8.96 | 1.21 | 8.00 | 11.6 | 8.96 | 1.00 | 1.45 | 1.12 |
| 10 | 1.5" Pipe— 6' Charcoal ... | 13.62 | 1.84 | 12.58 | 22.1 | 13.62 | 1.00 | 1.72 | 1.08 |
| 11 | 1.5" Pipe— 3' Earth ..... | ..... | ..... | 21.10 | ..... | ..... | 1.00 | ..... | ..... |
| 12 | 1.5" Pipe—10' Earth ..... | 7.39 | 1.00 | 6.60 | 8.4 | 7.39 | 1.00 | 1.27 | 1.12 |
| 13 | 1.0" Pipe—15' Earth ..... | 7.95 | 1.07 | 6.78 | 9.8 | 7.95 | 1.00 | 1.45 | 1.17 |
| 14 | Paragon Cones—Earth... | 12.63 | 1.71 | ..... | 22.8 | 12.63 | 1.00 | ..... | ..... |
| 15 | Paragon Cones—Charcoal | 10.35 | 1.40 | ..... | 19.4 | 10.35 | 1.00 | ..... | ..... |

Of the remainder, seven are operating all night on a moonlight schedule and operating a total of 859 lamps; receiving an average price of $69.08 per lamp per year. Two operate until midnight every night; representing a total of 89 lamps and receiving an average of $54.40 per lamp per year. The remaining 13 operate on a midnight moonlight schedule; operating a total of 164 lamps and receiving an average price of $63.90 per lamp per year. Twenty-four of the companies from whom replies were received have a more or less extensive curb lighting system. Practically every city having a population of over 5,000, and a great many of the smaller cities, including several towns having less than 1,000 population, can now boast of their "White Way." Tungsten lamps, both series and multiple, have come into general use for general lighting purposes in the smaller cities and for lighting alleys and outlying districts in the larger cities.

Business reports were then received from the secretary, treasurer, and Membership Committee. Following these reports President Blackwell appointed a Nominating Committee consisting of Messrs. Burt, Dodd, Brownell, Sawyer and Hanlon.

**Afternoon Session.**

The afternoon session opened with the presentation of the report of the Committee on Water Pumping of which J. P. Jones, of Cedar Rapids, is chairman. This report gave tabulated data on 28 plants, municipal and central station, showing in a few cases the rate obtained and the character of the electric and pump equipment. Mr. Jones explained that sufficient data were not given by those replying to make the report of much value for comparative purposes.

"The Effect of Central-Station Rates on New Business" was the title of the next paper, presented by H. S. Sines, of the Minerallac Electric Company, Chicago. This paper, which points out how additional profitable business can be secured by central stations by offering a special off-peak rate, appears elsewhere in this issue.

**Thursday Sessions.**

The paper entitled, "Building Up the Day Load in Small Central Stations," by H. J. Mauger, of Schenectady, N. Y., was the first one of the morning session on Thursday. This paper is divided into two parts, Part I giving general statistics on central-station conditions in towns of 5,000 and under and commenting upon a few methods of improving business and making day service profitable. Part II comprises notes on detailed information secured from 12 small towns. The classification of towns in the United States of 5,000 or under, showing number and population of towns having and not having day service is shown in the table.

| | 1,000 and Under. | | 1,000 to 5,000. | | Total | |
|---|---|---|---|---|---|---|
| | Towns. | Population. | Towns. | Population. | Towns. | Population. |
| With Day Service (A) | 1094 | 514,619 | 1671 | 3,953,965 | 2765 | 4,468,584 |
| No Day Service (B) | 1279 | 736,891 | 1589 | 2,888,030 | 2868 | 3,624,921 |
| Total | 2373 | 1,251,510 | 3260 | 6,841,995 | 5633 | 8,093,505 |
| Per cent of A to total | 46% | ..... | 51% | ..... | 50% | ..... |

The desirability of various classes of business such as household appliances, city water pumping, general power and agriculture were briefly commented upon. Attention was also called to the possibilities of ice-making and steam heating as auxiliaries for summer and winter operation. In the effort to secure power business, however, residence wiring should not be overlooked. The following table is of interest in showing the development of residence

**Paul B. Sawyer,**
Newly Elected President, Iowa Electrical Association.

business in point of houses wired and flatirons used.

| Town No. | 1 | 4 | 5 | 6 | 7 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|
| Population | 2100 | 1586 | 1800 | 1474 | 793 | 5000 | 1600 | 1300 | 2500 |
| (A) Houses Wired | 285 | 278 | 150 | 174 | 157 | 427 | 210 | .... | 240 |
| Ratio of A to Total Residences. | 70% | 85% | 40% | 63% | 78% | 35% | 65% | .... | 48% |
| (B) Flatirons in use | 225 | 111 | 75 | 125 | 110 | 120 | 75 | 75 | 140 |
| Ratio of (A) to (B) | 97% | 40% | 50% | 72% | 70% | 28% | 35% | .... | 58% |

H. W. Garner, of Oskaloosa, opened the discussion calling attention to the desirability of farm business. In the Oskaloosa territory about 12 miles of farm territory are available from a 11,000-volt transmission line operated by the company.

L. W. Boehner, of Malvern, stated that the Malvern Light & Power Company has several short farmers' lines radiating from the plant. The potential of these is 11,000 volts which is stepped down to 2,300 volts at the farms. A fixed charge is made with a meter rate of 15 and 6 cents per kilowatt-hour.

E. B. Hillman, of Quincy, Ill., spoke of the practice of central stations in two Illinois towns with regard to farmers' business. The customer is required to pay all expenses of the installation from the company's lines. A fixed rate and a meter rate are charged. The company has supervision over the entire installation. Mr. Hillman stated that some trouble has been experienced from lighting.

H. C. Blackwell, of Davenport, stated that a 33,000-volt transmission line is being built from Davenport to Muscatine, which will also serve three intermediate towns and a number of farms. The voltage of the latter lines will be stepped down to 6,600 and then to 110 and 220 volts at the customer's premises. Standard transformers for this service are now available. No trouble from lightning is anticipated. Mr. Blackwell stated that this business was secured without effort on the part of the company as the farmers in the various communities formed local associations to arrange all details and these associations will be responsible for collections, meter reading, etc. The company will bill each association for the total energy supplied to a group of farmers.

A. W. Zahm, of Mason City, referred briefly to the profitableness of farmers' business. He cites one instance where a farmer made an outlay of $600 for service to his farm where he had installed only one one-sixth-horsepower motor and a few lamps. This business has been increased to over 15 horsepower and is almost entirely off-peak.

"Central-Station Heating" was the subject of the next topic for discussion. Two papers were presented, one dealing with hot-water heating and one with steam heating. H. W. Garner, of Oskaloosa, was the author of the paper on the former, his subject being, "Ten Years' Operation of a District Hot-Water System." This paper describes the system which has been in service in Oskaloosa for the past 10 years. The company has 100,000 square feet of radiation connected. The rate charged is 17.5 cents per square foot of radiation per season. Coal, in 1911, cost $1.55 per ton. Mr. Garner stated that the business is very profitable.

The second paper, by J. C. Young, of Cedar Rapids, entitled, "Central-Station Steam Heating," was read by Mr. Metcalf of Cedar Rapids. This paper contains considerable data on what the author considers the three important

items of a financially successful system, namely, an efficient installation, fair and equitable rates and good service. Details of rates and operating conditions at Cedar Rapids are given.

The next paper taken up was presented by O. E. Brownell, of Lake City, entitled, "Oil Engines for Small Central Stations." The author made brief reference to the advantages and disadvantages of high-pressure and low-pressure oil engines. Conditions must dictate the adoption of either. General information collected by Mr. Brownell indicates that while fuel is not always as cheap as advertised and lubricating oil necessary in such quantities to make the expense appreciable, still oil engines are to be recommended for central-station operation. During 10 months' continuous operation at Lake City an oil engine installed there has given very good satisfaction although the operation of it has not been a simple proposition, according to Mr. Brownell. In reply to a question as to the economy of oil engines at light loads, he stated that figures available on two 50-horsepower engines showed a fuel cost of 17 cents and 9 cents per hour, respectively, on a 10-kilowatt load. In the latter instance oil cost three cents per gallon. One point emphasized by Mr. Brownell was that fuel oil should not be allowed to become too cold.

A. H. Ford, of Iowa City, called attention to the high cost of repairs for oil engines. Adolph Shane, of Ames, thought that more reliable information relative to oil engines should be collected and suggested that the Iowa Association should appoint a committee for this purpose. He also called attention to the fact that the oil engine, if successful, will provide the extremely small town with a means for having its own central station, and consequently companies now supplying these communities will eventually lose the business.

President Blackwell spoke of the possibility of obtaining junior students from the state university and college to conduct tests and compile figures on oil-engine costs, etc.

In closing the discussion Mr. Brownell stated that the cost of lubricating oil for his engine was eight mills per hour of operation.

The afternoon session was opened with a paper by William Bradshaw and A. W. Copley, entitled, "Requirements of Modern Alternating-Current Watt-hour Meters." Mr. Copley presented the paper. The mechanical and electrical performance of meters was discussed. The requirements for modern alternating-current, watt-hour meters from a mechanical standpoint cover a rigid permanent construction in a dust-proof case, with separate terminal chambers, a minimum of friction in the moving element and gear train which in turn requires the lightest moving element consistent with the requirement of strength and the best possible bearings; the whole to be in as small a case and as light as possible and at the same time to have all the adjustments easily accessible. The electrical requirements cover high accuracy and permanent accuracy under changing conditions of load, voltage, frequency, power-factor and temperature and an immunity from the effects of stray magnetic fields or short-circuit conditions. Close co-operation between the lighting companies and the manufacturers will tend toward improvement in the meters not only because of the fact that the manufacturer can be guided by the experience of the operating companies, but also because the latter can so modify their requirements as to make them agree with the best manufacturing practices.

This paper was followed by an interesting illustrated lecture on "Steam Turbines and Condensers," by J. B. Wilkinson, of the Westinghouse Machine Company. Several new departures in steam-turbine design were illustrated, the majority being for greater efficiency and space economy in the units for small and medium-sized stations.

The concluding feature of the program of papers was an illustrated talk by C. T. Reiss, of the General Electric Company, on "Representative Motor Installations in Iowa." Power data from a number of Iowa cities were given and a number of views of typical motor installations shown.

The convention then went into executive session, at which the following officers were elected for the ensuing year:

President, P. B. Sawyer, Dubuque.

Vice-president, A. L. Dodd, Charles City.

Secretary, A. W. Zahm, Mason City.

Treasurer, W. A. Mall, Belle Plaine.

The members of the new Executive Committee are: M. A. Harrison, Nevada; H. W. Garner, Oskaloosa, and H. B. Maynard, Waterloo. Resolutions of thanks to the retiring officers, the Des Moines Electric Company and the manufacturers and supply men were adopted. The next annual convention will be held in Waterloo, Ia., April 23 and 24.

### Annual Banquet.

The annual banquet tendered to the central-station men by the manufacturers and supply men on April 20, was one of the most successful and enjoyable affairs held at an Iowa convention. H. C. Blackwell acted as toastmaster.

The first speaker was Nathaniel T. Guernsey, an attorney of Des Moines, who chose for his subject, "Should Public Utilities be Pure Philanthropies?" Mr. Guernsey spoke of the popular desire of the public that public utilities earn no more than 5 or 6 per cent on their investment while no criticism is made of other business earning 10 to 25 per cent. This of course makes it difficult to secure capital to properly develop the business and ultimately will work as great a hardship on the public as on the utilities. Attention was called to the importance of properly valuating public utility properties and preparing for commission regulation. This is inevitable as public utilities must logically be monopolies and as such should be subject to regulation by state commissions.

Woodworth Clum, of Davenport, spoke on the "State of Iowa," defining the "Greater Iowa" movement and P. G. Holden concluded the program with an interesting address on the subject of, "Relation Between the Business Man and Politics."

## Convention of the Iowa Street and Interurban Railway Association.

The ninth annual convention of the Iowa Street and Interurban Railway Association was held in Des Moines, Ia., April 25, 26 and 27. Mayor James R. Hanna, of Des Moines, welcomed the delegates to the city, and F. J. Hanlon, of Mason City, made a fitting response. Numerous reports occupied the greater part of the morning session, which was brought to a close by a paper on "Operating Limited Trains on Short Interurbans," by P. P. Crafts, of Davenport.

At the afternoon session two papers were presented, one by R. A. Leussler, of Omaha, entitled, "Some Experiences with Prepayment Cars," and the other on the subject of "Gas-Electric Motor Cars," by H. G. Chatain.

Friday's sessions included the following papers: "How to Locate Industries on Your Line," by C. M. Cheney, Waterloo; "Experiences on Small Electric Properties," by J. P. Walters, Toledo; "Use of High-Efficiency Lamps," by S. E. Doane, Cleveland; "Why Railroad Financing in Iowa Is Difficult," by F. E. Farwell, Waterloo.

On Saturday an executive session was held and the officers elected for the ensuing year.

## Parade of Motor Trucks.

The second annual parade of the New York Motor Truck Club was held April 13 with over 500 vehicles in line. A large number of electrics of all capacities were entered.

# New Electrical and Mechanical Appliances

## D & W Magnetic Chucks.

A valuable labor and time-saving device for use in machine shops has been developed by the D. & W Fuse Company, of Providence, R. I. It is a magnetic chuck which possesses a wide range of usefulness in holding steel and iron pieces for grinding, planing, shaping and milling. When a large number of pieces are to be machined it has frequently been found that the time and labor saved by the use of this device compared with former methods of clamping, bolting and holding one piece at a time in a vise, repays the entire first cost of a magnetic chuck within seven to ten days of service.

Fig. 1.—Flat Chuck.

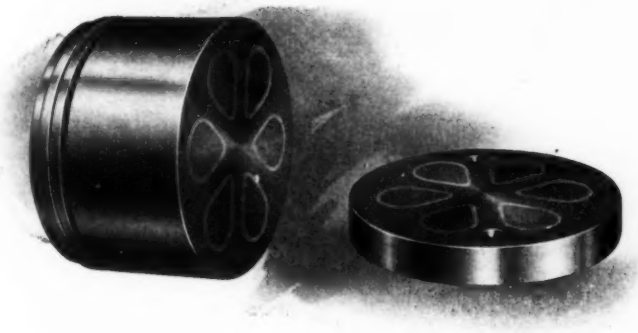


Fig. 2.—Rotary Chuck.

These chucks are made in several types, the flat, vertical and rotary. The flat chucks (Fig. 1) have a horizontal face and are equipped with adjustable end and side stops, providing convenient means for holding and steadying the work on the surface of the chuck. They have been found particularly useful for holding work for grinding, such as file blanks, scale blanks, punches, dies, knives for woodworking machines, and similar work on which it is necessary to grind flat surfaces. Thin stock can be held for grinding on one face without any distortion due to clamping the edges. Milling operations can be performed with great facility and the chuck can be usefully employed for holding stock undergoing light planing or shaping operations.

The vertical chucks have an upright holding face when clamped to the horizontal machine platen. They are especially adapted for use on grinders having a cup wheel on a horizontal spindle, but they are otherwise similar to the flat chucks. The rotary chucks have met with considerable success in plants manufacturing ball and roller bearings. They have no equal for effectiveness in holding ball races while being ground to finished size. They can also be used for grinding piston rings to fit the ring grooves with extreme accuracy. Fig. 2 shows one of the rotary chucks with an auxiliary plate.

Previous atempts to devise magnetic chucks have not always been successful because of frequent burning out of the magnetic coils when subjected to variations of voltage, or to moisture and prolonged service. In the new D & W chucks, the magnetic coils are wired with Deltabeston wire having special insulation of pure asbestos, which can safely withstand temperatures up to 400 degrees Fahrenheit. The coils are specially wound by a process which further protects them from heat and moisture. The coils are rigid units which are interchangeable and the construction of the chuck is such that they can readily be replaced by any intelligent workman.

Auxiliary plates are provided with some of the chucks, which have been found useful as jigs or fixtures for the holding of special or irregularly shaped pieces. The design and construction of these chucks are such as to give them a stronger holding power than has heretofore been obtainable. Both the flat and vertical chucks have their ends machined perfectly true so that several of them can be lined up end to end for holding long work or for machining many small parts at one operation. Thus the separate units can be used on different machines, or they can be assembled into one long chuck controlled by a single switch.

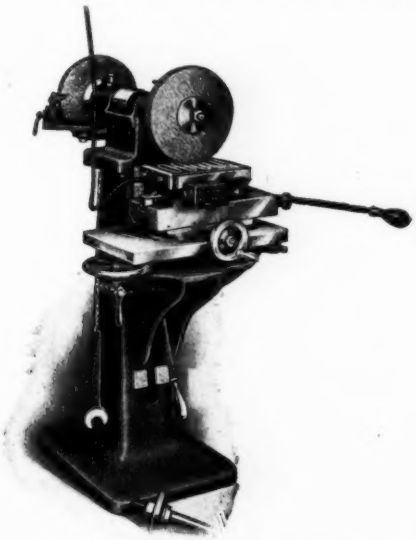


Fig. 3.—Surface Grinder Equipped with Flat Chuck.

With the exception of the smaller sizes these chucks are designed for connecting directly to 105 to 125-volt, direct-current circuits. If 220-volt or

even 550-volt, circuits must be used, a convenient form of auxiliary resistance is supplied which may be inserted at any point in the circuit. Small chucks are equipped with standard external resistance units for use on the ordinary 110 to 125-volt circuits. Where direct current is not available, there are supplied motor-generator sets or small direct-current generators that may be belted to a line shaft and which supply from one to 12 chucks from one generator. The chucks are equipped with demagnetizing switches for readily releasing the work. Wherever possible, a special switch is attached directly to the chuck.

Where it is not practicable to mount this switch on the side of the chuck, an independent control base is provided.

## An Aluminum Weatherproof Socket.

An aluminum lamp socket for outdoor service has been placed on the market by the E. H. Freeman Electric Company, 803 East State Street, Trenton, N. J. Among its distinctive features are its rugged and simple construction and the speed with which

Freeman Weatherproof Socket.

it may be wired and installed. This ease of wiring is secured by the separation of the cap from the base, which also permits the wireman to make connections with binding screws without having to use any surplus wire. Both the cap and metal shell are threaded to insure great strength and simplicity in assembling. The contacts and spring parts are made of phosphor bronze. These sockets can also be supplied with brass shell and can be made to take a shade-holder, if desired.

## Automatic Sprinklers Efficient.

Franklin H. Wentworth, secretary of the National Fire Protection Association, stated at the meeting of the New England Foundrymen's Association, April 10, that out of more than 11,000 fires under automatic sprinklers, of which the Association had records during the past fifteen years, there was not a single instance where the automatic sprinkler, when of standard, approved make and installation, had failed to put out or hold in check a fire under it except in cases where the system had been tampered with, or crippled by an explosion.

## A New Method of Measuring Steam Consumption.

The steam consumption of a turbo-generator has been reduced to as low as 12 pounds per kilowatt-hour. This high economy is secured by careful operation and by refinements in efficiency of auxiliary apparatus. But if the operating force has no guide in maintaining high efficiency, a fall in pressure, superheat or vacuum, a badly adjusted load, or wear of turbine blades, may cause loss of economy which is far more serious than is realized.

The steam consumed by a turbine or engine can be determined with accuracy by weighing the water or condensate from a surface condenser. Very few plants have employed this method of measurement, due to the fact that ordinary weighing or measuring devices are costly and clumsy and add not only to the expense but complicate piping. A simple, accurate and direct solution of the problem is presented in the indicating hotwell, which is similar in size and appearance to the ordinary hotwell, and is attached directly to the bottom of the condenser, forming a part of the shell.

Wheeler Indicating Hotwell.

The indicating hotwell is attached directly beneath the condenser. The opening in the bottom of the condenser is built so that the condensate drains into the left-hand chamber of the hotwell, and communication from this chamber to the hotwell pump suction is secured through an orifice in the dividing wall.

The velocity of discharge through an orifice of given diameter varies directly as the square root of the head, and the quantity of water discharged is equal to the product of this velocity, the area of the orifice and the coefficient of contraction. With a properly designed orifice this coefficient remains almost exactly constant for widely different values of the head upon the orifice, and therefore the quantity of discharge is obtained with a high degree of accuracy by a carefully calibrated indicating gauge glass, reading the head.

As may be seen from the illustration, the orifice is formed in a brass plate inserted in the partition wall. It is polished and finished to insure accuracy of flow. Especially manufactured fittings are used to attach the indicating gauge to the shell of the hotwell. Ball check valves are provided in each fitting so that should the gauge glass break the inflow of air will be prevented and the gauge glass can be replaced at leisure. A gauge glass is also provided to show the height of the water in the hotwell suction compartment, where the water must not be allowed to submerge the orifice. The scale attached to the indicating gauge reads directly in pounds of steam per hour. Each orifice is made independently, carefully calibrated, and a special scale, etched upon steel, furnished for it.

The indicating hotwell is a practical and simple solution of the problem of measuring steam consumption. The indicating gauge reads pounds of steam per hour; the station wattmeter gives load in kilowatts, and the rate of steam consumption in pounds per kilowatt-hour is obtained by simple division. This figure entered regularly upon the engineer's log sheet, and charted from day to day, is of the greatest importance in maintaining high plant economy.

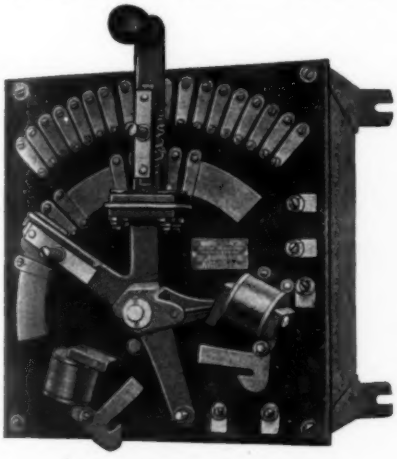
This indicating hotwell is manufactured by the Wheeler Condenser & Engineering Company, Carteret, N. J.

## Venezuela Telegraph Development.

The Government of Venezuela has decided to construct a telegraph line between Maracay and Ocumare, on the coast. The director general of Federal Telegraphs will begin work immediately.

## A New Cutler-Hammer Reversible Motor Starter.

The reversible motor starter illustrated herewith is a new type recently put on the market by the Cutler-Hammer Manufacturing Company, of Milwaukee, Wis. For service requiring a motor capable of being operated at full speed in either direction, the reversible starter combines in one device a reversing switch and also means for proper acceleration of the motor in either way. One operating lever only is required, but two no-voltage-release latching devices are provided so that the lever will be held in the full-speed position in either direction. Interruption of current supply or excessive voltage drop causes the operating lever to be thrown to the central, or "off," position by a centering spring after the release magnet has dropped the latching device. Renewable segments are employed.



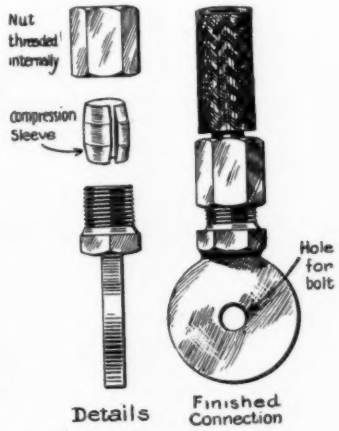
Reversible Motor Starter.

## Construction and Use of Dossert Solderless Terminal Lugs.

The methods generally in use for connecting wires to terminal lugs involve the use of a blow-torch or plumber's furnace for soldering the joint. Some ten distinct steps in making the joint are required. This makes the work tedious, and, unless done with care, results in an unsatisfactory connection. Cables and wires frequently drop out of the lugs into which they have been soldered because the solder did not make a proper joint with either the wire or the barrel of the lug. If the wire does not drop out, it frequently remains loose in the lug and causes heavy local heating that does not necessarily resolder the joint because of dirt, oxidation or other reason. The insulation near the joint is usually scorched.

The attempt to get away from the trouble and unreliability of soldering terminal lugs led to the development of the Dossert solderless connector, the construction of which is clearly shown in the accompanying views. The shank of the lug is threaded externally and the hole is tapered. The compression sleeve is tapered at both ends and slotted longitudinally. The nut is threaded internally and is tapered at the outer end. When the conductor is thrust into the lug and the nut is tightened up the action of the tapers and slotted sleeve exerts a pressure on the cable or conductor of several thousand pounds to the square inch, according to size, thereby making good electrical contact.

The use of this connector is very simple. The insulation is cut from the end of the conductor and its end brightened by scraping or filing; the conductor is then pushed into the hole in the lug, finally the nut is tightened with a wrench. The only tools actually required are a knife and wrench, although an insulation-cutting pliers and file may be used for the knife. The wireman can make the joint quickly, without a helper or the use of solder and dangerous torch.




Dossert Solderless Terminal Lug.

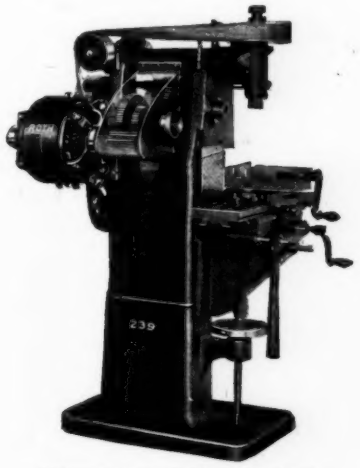
These connectors are made by Dossert & Company, 242 West Forty-first Street, New York City.

## Motor Drive for a Milling Machine.

An interesting example of a direct application of the electric motor to a milling machine, which exemplifies the present tendency in motor-driven machine design, is shown in the accompanying illustration. Economy in space and efficiency in operation are the two most important conditions attained by such application.

It will be noted that the motor is bolted against the column of the machine and that it is provided with a long pinion. This pinion drives a large rawhide gear mounted on a sleeve, on which is also mounted a smaller rawhide gear. These two gear wheels are movable on a fixed stud, thus allowing the large rawhide gear to mesh into the smaller of the two steel gear wheels on the milling-machine spindle; or by shifting the two rawhide gear wheels the smaller one of these will engage with the large steel gear wheel on the spindle.

When the motor drives directly through the large rawhide gear onto the small steel gear on the spindle, the large rawhide wheel acts as an idler only, but when the drive is through the large rawhide gear and then through the small to the large steel wheel on the spindle the gearing acts to reduce the speed of the spindle.



Motor-Driven Milling Machine.

The motor is a one-horsepower, 1,200-revolutions-per-minute machine, wound for 230-volt circuit. It is provided with a double-throw service switch so that the motor in operation also runs on 115 volts. Thus, in starting on 115 volts and with the reducing gear in operation the slowest speed of the spindle will be 116 revolutions per minute, which can be increased by field weakening up to 232 revolutions per minute at which point the 230-volt circuit would be used with full field at 232 revolutions and up to 464 revolutions with weakened field. With the motor geared direct, the speed with 115 volts full field is 340 revolutions, which can be increased to 680 by weakening the field at which point the 230 volts would be used, giving again 680 revolutions with full field and up to 1,000 with weak field.

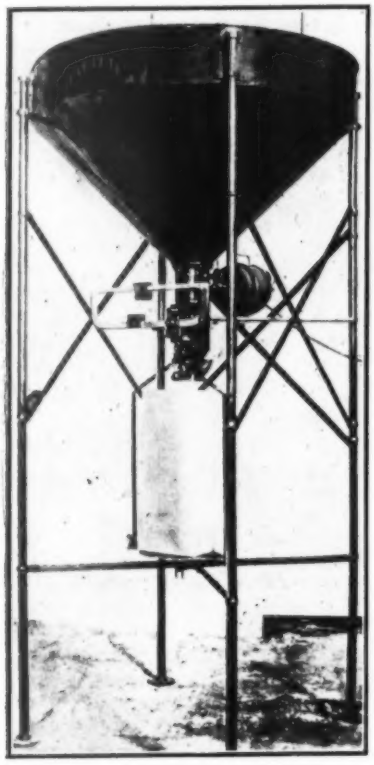
The milling machine is of a type known as the Chicago, manufactured by the Chicago Tool Company. The motor is manufactured by Roth Brothers & Company, Adams and Loomis Streets, Chicago, Ill.

## Motor Drive for Automatic Weighing Machines.

Sugar refineries, wholesale groceries, canneries, candy factories, bakeries, etc., wherever large quantities of sugar are handled, have long felt the need of a practical weighing machine.

The Pacific Automatic Weighing Machine Company, Oakland, Cal., is marketing an automatic sugar weigher with a novel motor application. The motor drives an agitator which stirs the sugar and insures an even flow and correct weight at all times by the prevention of lumping and clogging in the hopper.

The operation of weighing out a



Motor-Driven Sugar Weigher.

large number of packages containing one, two, three or five pounds of sugar may be done in very much less time with the weighing machine than by the manual method.

Another advantage is the uniform weight; when the weighing beam is set at five pounds, for instance, the package is sure to contain exactly that amount—no more, no less—while with hand weighing it is next to impossible to give exactly the same uniform weight.

The motor is a one-twentieth-horsepower Westinghouse machine and is applied directly to the weighing mechanism at the bottom of the hopper. It is connected to the agitator by means of a worm and gear. These motors have been extensively applied to machines of this character. They consume very little current and are exceedingly reliable in operation.

The motor control is effected entirely by the weighing beam. When the beam comes to a horizontal position, a switch is closed which starts the motor. When the required amount of sugar has passed from the receptacle, the weighing beam drops to an inclined position, thereby stopping the flow of sugar and at the same time opening the switch and stopping the motor.

## A Detachable Electric Rowboat Motor.

The electric boat-propelling device shown herewith is attracting the attention of hunters, fishermen, automobilists and pleasure seekers at summer resorts all over the country. This portable device weighs complete 25 pounds and can be attached in a few minutes to any canoe or rowboat by means of adjustable clamps. One can pack this small rowboat motor under the seat of an automobile or in a suitcase and visit any summer resort, using any canoe or rowboat he may find there.

The Jewel rowboat motor is so simple and absolutely noiseless that it can be used in trolling or still fishing without scaring the fish. This motor is also desirable for duck hunting where it is necessary to propell a boat on the water without noise.

The inventor of the patented Jewel motor has had ten years' practical experience in designing electric boat-propelling devices and storage batteries. This is the second season that the Jewel rowboat motor has been on the market and the practical value of such a device has been demonstrated. Large lumber camps are using them for practical work. They are used on yachts for emergency when there is no wind. Many large boats use them on auxiliary skiffs. This season they will be tested out by certain departments in the United States Navy.

The mechanical and electrical features may be described as follows: The motor is mounted vertically on a supporting tube and has a maximum speed of 2,500 revolutions per minute. Two six-volt, 60-ampere-hour storage batteries connected in series supply current for the motor. The motor is direct-connected to a vertical transmission shaft about two feet above the water line. The power is transmitted to a pair of special gears. The circular gears operate in a gear housing below the water line and change the vertical power transmission to the horizontal propeller shaft. The lower gear housing and the two-blade propeller are made of an alloy of aluminimum which reduces the weight of the device. The entire outfit is highly nickeled and has a handsome appearance.

The electric motor shaft runs on Hess-Bright ball bearings and all other bearings are of manganese bronze. The gear housing is watertight, so as to keep the gears operating in a bath of oil. Once the housing is filled with oil there will be sufficient lubrication for six months' running. The lower bearing of the motor is screwed into the vertical supporting tube and the motor shaft slips into a groove socket in such a manner that when the motor is unscrewed the entire machine can be taken apart in a few seconds and packed in a carrying case.

The rowboat motor is used both as a propelling device and also as a rudder. The slightest change in the angle of the propeller changes the direction of the boat. Direction of boat can be reversed by simply turning the entire motor on the swivel arm. At the top of the motor is fitted a steering wheel made of aluminum and an adjustable handle is secured to this wheel in such a way that

Jewel Detachable Rowboat Motor.

its position can be changed in a moment by means of two thumb screws.

On top of the steering wheel is mounted a rotary switch. This switch is waterproof and provides three speeds. The proper speed regulation is obtained by varying the field excitation. If a lower speed is desired, only one six-volt battery need be used. For commercial uses where large heavy boats must be operated a three-horsepower motor can be used with a larger three-blade propeller.

Every detail of the mechanism is worked out in such a practical manner that the entire device is foolproof and the number of parts made a minimum.

The Jewel detachable rowboat motor is manufactured by the Jewel Electric Company, 1122 South Michigan Boulevard, Chicago, Ill.

## Des Moines Electric Show.

In conjunction with the convention of the Iowa Electrical Association and the Iowa Street and Interurban Railway Association held in Des Moines, Ia., April 24 to 27, there was held in the Des Moines Coliseum the largest and most comprehensive electric show ever held in Iowa, and one of the largest ever held in conjunction with a state electrical association.

C. A. Willoughby, of Des Moines, is deserving of great credit for his untiring efforts as manager of the show. The interest and enthusiasm manifested by the delegates and guests of both associations as well as the heavy attendance by citizens of Des Moines,was convincing evidence of the degree of success achieved by Mr. Willoughby.

The show was open to the general public every afternoon and evening. Band concerts were given each session and several features of popular interest provided. The exhibit of a United States wireless station, actually receiving and transmitting messages, was accorded unusual attention, as well as the Thorardson high-frequency demonstrations. Of interest, also, were the cooking demonstrations of the Y. W. C. A. domestic-science classes.

The following is a partial list of exhibitors with brief descriptions of the exhibits mantained:

Allis-Chalmers Company, Milwaukee, Wis., had on exhibition a small turbo-generator and small motors and transformers. The company was represented by E. Dryer, A. W. Burns and B. P. Parsadeniea.

Julius Andrae & Sons Company, Milwaukee, Wis., exhibited American Electric Company's cooking and heating appliances and miscellaneous supplies. Otto Borchet and Andrew G. O'Rear were in attendance.

Bell Electric Motor Company, Garwood, N. J., had on exhibition a complete line of small single-phase motors, ranging in size from one-half to 15 horspower. The company was represented by T. R. Bell.

Benjamin Electric Company, Chicago, had an attractive display of various lighting fixtures and material, including Benjamin reflector-sockets, industrial fixtures, tungsten arcs and other specialties. The company was represented by A. E. Lubeck.

Bryan-Marsh Company, Chicago, Ill., had on exhibition a complete line of Mazda lamps of all sizes. A feature of this exhibit was the new Bryan-Marsh color-matching lamp, shown for the first time at an exhibition. Sam Furst represented the company.

Century Electric Company, St. Louis, Mo., exhibited a complete line of single-phase motors. The company was represented by H. M. Bowen.

Dearborn Drug & Chemical Works, Chicago, Ill., exhibited samples of boiler compounds, etc. The company was represented by F. C. Gibbs.

Downing Electric Company, Des Moines, exhibited General Electric, Emerson, Robbins & Myers and Dayton fans; American heating and cooking appliances; Alba and Holophane glassware; Trumbull products; Cutler-Hammer fittings and General Electric lamps. Represented by H. C. Downing, A. E. Potts and C. R. Gilbert.

Duncan Electric Manufacturing Company, Lafayette, Ind., exhibited a complete line of alternating and direct-current watt-hour meters and switchboard instruments. H. G. Hall was in attendance.

Electric Appliance Company, Chicago, Ill., exhibted A-W Mazda street-lighting outfits, Sangamo meters, Packard transformers, Emerson fans, American Electric heating appliances, Crouse-Hinds condulets and panel boards, Thor electric washing machines and Benjamin tungsten arcs. The company was represented by Perry Boole, C. F. Alline and J. K. Alline.

Fairbanks-Morse & Company, Chicago, Ill., had on exhibition a line of alternating and direct-current motors and generators, a special oil engine, contractors' and railway tools and supplies and Monarch incandescent lamps. The company was represented by J. B. Ball, L. H. Matthews, George B. Coleman, W. M. Bartlett and E. K. Stoddard.

Fort Wayne Electric Works, Fort Wayne, Ind., exhibited watt-hour meters, bell-ringing transformers, small motors, lighting transformers, alternating and direct-current fan motors series alternating regulators, switchboard panels and various instruments. The company was represented by A. L. Pond, A. P. Dunn and W. L. Fawcett.

Franks Manufacturing Company, Rock Island, Ill., made a comprehensive exhibit of the only adjustable incandescent lamp fixture at the show. These included floor standards, wall fixtures, ceiling fixtures, etc., all with the patented adjustable feature which allows the lamp to be placed in any position. W. L. Franks was in charge.

W. R. Garton Company, Chicago, Ill., exhibited the Electric Railway Equipment Company's overhead material. Stackpole carbon brushes, Waterbury wire and cables, Bliss tool-steel gear and pinion teeth, Heany fireproof wire and the Lord Manufacturing Company's retrievers, lightning arresters, etc. E. Lewis was in attendance.

General Electric Company, Schenectady, N. Y., exhibited a complete line of chafing dishes, percolators, toasters, sad irons, sealing-wax heaters, motors, glue pots induction and direct-current fans of all sizes, small motors from one-thirtieth to two horsepower, transformers and electric drills. The company was represented by S. F. Dibble, A. R. McMullin, G. B. Walker, W. Kahl, J. Buchanan, J. D. A. Cross, C. Matteson and C. T. Reiss.

Grinnell Washing Machine Company, Grinnell, Ia., exhibited a complete line of Elmo electric washers. The company was represented by M. A. Milyer.

Hurley Machine Company, Chicago, Ill., had on exhibition a complete line of Thor electric washing machines.

Illinois Electric Company, Chicago, Ill., exhibited a complete line of Klein's tools, American, Star brand, weatherproof wire, Pierce specialties, American heating and cooking devices, Orangeburg fiber conduit, Bryan-Marsh Mazda lamps and Westinghouse and Duncan meters. The company was represented by J. A. Duncan and H. H. Morehouse.

H. W. Johns-Manville Company, Plainville, Conn., exhibited Linolites, friction tape, batteries, rubber conduit, Noark fuses, fuse blocks, molded mica sockets, asbestos wood and a complete line of packing, roofing and pipe coverings. The company was represented by W. B. Roberts.

Kinetic Engineering Company, Chicago, Ill., had on exhibition several models of the electric organ blowers.

McDonnell Iron Works, Des Moines, Ia., had on display eight different designs of ornamental lighting posts. This company also furnished the 54 five-light standards which were placed about the Coliseum. J. E. McDonnell, D. Locker and J. H. Ruecker were in attendance.

Minerallac Electric Company, Chicago, displayed the Maxicator, an instrument for converting the ordinary meter to a maximum indicating and watt-hour meter; and Printometers, both portable and service types. The company also exhibited its new Unity insulator, a combination insulator and pin in one piece; insulating compounds and tape; and cable and conduit hangers. The insulators were shown successfully withstanding, without leakage, a potential of 1,000,000 volts. The company was represented by H. S. Sines and J. R. Calhoun.

Monarch Electric & Wire Company, Chicago, Ill., showed samples of Monarch weatherproof wire, a line of Hunter and Tuerk fans and miscellaneous construction material. The company was represented by H. E. Mason and Henry Schwab.

Wagner Electric Manufacturing Company, St. Louis, Mo., had on exhibition a converter for changing alternating current to direct current for storage-battery charging, moving-picture machine arcs, X-Ray machines, etc., transformers, alternating-current motors and the rectifier for charging ignition and lighting batteries for gasoline cars. A feature of the exhibit was a demonstrating set comprising two Arnold single-phase motors and a new unity-power-factor motor on the same circuit, connected to a switchboard with instruments showing current taken by each motor and a totalizing meter for illustrating the reduction in amperage when the unity motor is cut in. The company was represented by W. R. Patton and H. E. Griffin.

Western Electric Company, Chicago, exhibited interphones, T. T. C. fixtures, indirect-lighting units, Sunbeam lamps, heating devices, vacuum cleaners, washing machines, fans, etc. The company was represented by C. L. Goldin, W. T. Hoagland and C. E. Roberts.

Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa., exhibited a complete line of electric heating devices, comprising toasters, sad irons, chafing dishes, milk warmers, radiators, etc., fan motors, including air and mechanically operated oscillators, desk and exhaust fans, watt-hour meters, testing instruments, railway line material, sewing machine and small power motors, wire-type tungsten lamps of all sizes, various sizes of transformers and lightning arresters. The company was represented by W. R. Pinckard, A. M. Miller, W. E. Gant, C. W. Regester H. L. Garbutt, C. R. Wood, J. W. Busch, A. W. Copley, J. A. Arnez and J. B. Wilkinson.

# Latest Approved Fittings

**The electrical fittings illustrated and described in this department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association.**

**ATTACHMENT PLUGS, FUSELESS.—Bryant Electric Company,** Bridgeport, Conn.

"Bryant," 660 watt, 250 volt.

Porcelain base, brass cap. Catalogue No. 1948.

Approved April 11, 1912.

**BUSHING, PORCELAIN. — American Bushing Company,** 69 West Washington Street, Chicago, Ill.

"Am. Bush Co." Clamp Bushings.

Types A1 to A6 inclusive.

Approved April 1, 1912.

**CONDUIT BOXES. — Stanley & Patterson,** 23 Murray Street, New York, N. Y.

Cast iron boxes for use with three-quarter-inch and one-inch conduit. These boxes are to furnish a mounting and a projecting covering for receptacles for attachemnt plugs.

Catalogue Nos. 3300, 3350, 3400 and 3450.

Approved March 23, 1912.

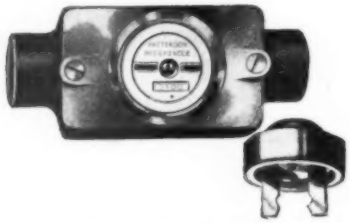


Fig. 1.—Conduit Box, Receptacle and Plug, Stanley & Patterson.

**CONDUIT BOXES.—Irish Electric Company, W. F.,** 60 Cortlandt St., New York, N. Y.

"Shamrock" cast-iron conduit outlet boxes for armored cable, with removable stud.

Approved April 11, 1912.

**FIXTURES.—Cassidy & Son,** 133-135 West Twenty-third Street, New York, N. Y.

"Cassidy" Electric and Combination Fixtures.

Fixtures approved by Underwriters' Laboratories have standard labels attached. This manufacturer is equipped to supply fixtures so labeled.

Approved April 3, 1912.

**FIXTURES. — Royal Art Glass Company,** 243 Canal Street, New York, N. Y.

Fixtures approved by Underwriters' Laboratories have standard labels attached. This company is equipped to supply these fixtures so labeled.

Approved April 4, 1912.

**INSULATING LINKS, for Chains of Pull Sockets.—Harvey Hubbell, Incorporated,** Bridgeport, Conn.

"Abbott" Insulating Link.

A device designed to be inserted in the chain of a pull socket to insulate the lower end of the chain from the upper end.

Approved April 1, 1912.

**LAMPS, INCANDESCENT.—Portable Electric Safety Light Company,** Newark, N. J.

Electric Safety Lantern, Type B.

A portable electric lantern in which an alkaline storage battery enclosed in a tight metal casing supplies four-volt current to one or two small incandescent lamps which, together with a special switch, are mounted on the front of the casing and covered by a heavy protecting glass front or lens. The lantern weighs about six pounds and is designed to render service continuously for twelve hours.

The fire hazard of this lantern under any conditions liable to be met in service is judged to be practically negligible, although it is recognized that under conditions remotely possible, the more explosive vapors can be ignited by the breaking or displacement of the lamps used.

The results of tests supplemented by reports of extensive field experience indicate that this lantern is suitable for general use and is especially suitable for use wherever inflammable or explosive vapors or gases are liable to be encountered.

Approved April 11, 1912.

**LAMP ADJUSTERS.—Harter Specialty Company,** 122 Madison Street, Waukegan, Ill.

Lamp Adjuster consisting of a spring-actuated drum and two guide pulleys. Standard for use with reinforced cord only.

Approved April 11, 1912.

**LAMP ADJUSTERS.—McGavin & Company,** 1163 North Ninth Street, Springfield, Ill.

"Yankee Adjuster."

This device consists of a plate of red fibre having tubular rivets for wearing surfaces of the adjusting cord and a brass finger which acts as a brake when adjusting the lamp. Two wooden balls, one at each end of the adjusting cord, are provided, one having a small slot in the side for the edge of a lamp shade when used for adjusting the angle of the shade.

Standard for use with pendant flexible cord.

Approved March 27, 1912.

**SOCKETS, STANDARD. — Harvey Hubbell, Incorporated,** Bridgeport, Conn.

Key, "New Wrinkle." Catalogue No. 3664.

Approved March 28, 1912.

**WIRES, MISCELLANEOUS.—Duplex Metals Company,** Chester, Pa.

"Copper-Clad" Steel Wires—40 per cent.

This wire consists of a steel core about which is welded an outer jacket

Fig. 2.—"Yankee" Lamp Adjuster, McGavin & Company.

of commercially pure copper which forms 40 per cent of the total cross-section area.

Standard for aerial wires of municipal fire alarm systems when provided with an approved insulating covering.

Approved April 11, 1912.

**WIRES, RUBBER-COVERED. —** Rubber-covered wires confronting to the specifications of the 1911 edition of the National Electrical Code and properly labeled by the Underwriters' Laboratories, are supplied by the following additional manufacturers.

**Imperial Wire & Cable Company, Limited,** Montreal, Canada.

Marking: Yellow thread woven in braid.

Approved March 19, 1912.

**Rome Wire Company,** Rome N. Y.

Marking: One yellow and one green thread twisted together running parallel with wire between rubber insulation and braid.

Approved November 13, 1911.

# Current Electrical News

## LIGHTING AND POWER.

*(Special Correspondence.)*

STOCKDALE, TEX.—V. B. Colley, of Smiley, will install an electric light plant here. D.

OAKLAND, CAL.—The Oakland Company has purchased a site and will erect a plant. C.

ALPINE, TEX.—Charles A. Schraff contemplates installing an electric light plant at this place.

ORANGE CITY, IOWA.—An electric light franchise has been granted to T. W. Michel. C.

PAULINA, IOWA.—It has been voted to issue bonds to improve the electric light plant. C.

RICHTON, MISS.—Richton Lumber Company is contemplating building a light and power plant.

CARROLL, IOWA. — Electroliers will be substituted for the incandescent lamps in the business district.

SCHENECTADY, N. Y.—The Schenectady Board of Trade is agitating a luminous "White Way" for State Street.

LAVONIA, GA.—This city will issue $50,000 electric-light bonds. For further particulars address the Mayor.

OKLAHOMA CITY, OKLA.—W. A. Graham is contemplating the installation of an electric lighting plant at Cement.

RIALTO, CAL.—Bids will be received up to May 21 for a 50-year franchise for an electric transmission system.

BLUFTON, IOWA.—It is said that John Mara, Cresco, is preparing to build a power plant on the Iowa River here.

CATEECHEE, S. C.—Norris Cotton Mills Company contemplates enlarging its dam and installing a hydroelectric plant.

BURBANK, CAL.—Bids will be received up to May 25 for a 40-year franchise for an electric light and power system.

KANSAS CITY, MO.—The Missouri Valley Light & Power Company has been incorporated with a capital stock of $250,000.

COLUMBUS JUNCTION, IOWA. —A franchise has been granted to E. N. Miller and work on the plant will begin at once. C.

NEWMAN, GA.—The Georgia Power & Electric Company contemplates running a power line from this town to Tallulah Falls.

RAY, N. D.—A franchise has been granted to the Williston Electric Construction Company, who will erect a light and power plant. C.

CEDAR BLUFFS, NEB.—At a special election here it was decided to bond the village for $8,000 to install an electric light system.

DEMING, N. M.—The Deming Ice & Electric Company will build about 30 miles of electric transmission lines during the next few months. D.

LYNDEN, WASH.—The Lynden Mill & Light Company has been granted a franchise to construct and operate an electric plant in this city.

CLIFTON FORGE, VA.—Clifton Forge Public Service Corporation will construct an electrical transmission line to Covington, a distance of 13 miles.

AVOCA, N. Y.—The Wayne Power Company, it is announced, has decided to install a system of electric lighting at this place, Wallace, Cohocton and Atlanta.

SILVER CITY, IOWA.—A franchise has been granted to the Glenwood Electric Light & Power Company for the construction of a line in Hill County. C.

QUINCY, CAL.—The Indian Valley Light & Power Company is arranging to extend its transmission lines from Greenville to Crescent Mills, Taylorsville and Indian Falls.

FRIENDSHIP, WIS. — Friendship Electric Light & Power Company has been incorporated with a capital of $15,000 by C. L. Meinke, George W. Bingham and John P. Lewis.

MURRAY, UTAH.—Murray is to have a municipal power plant, and preparation for the installation will commence at once. It is proposed to issue bonds in the amount of $50,000.

LOWELLVILE, OHIO.—It is reported that the Mahoning & Shenango Valley Railway & Light Company has plans for the expenditure of $2,000,000 this year on a new power house.

FAIRFIELD, ME.—The Pettee's Pond Power Company has been incorporated with a capital stock of $50,000. John P. Clark, Skowhegan, has been elected president of the company.

KNOXVILLE, PA.—Knoxville Light Company has been incorporated with a capital stock of $5,000. The incorporators are J. F. Grimes and J. P. Moore, of Knoxville; and J. P. Caufield, of Verona.

HANOVER, IND.—The Madison Light & Railway Company proposes to transport electricity from its station in Madison to Hanover; a distance of eight miles. S.

COLUMBUS, O.—The Ohio Electric Company has announced its intention to build new steel car lines in the city of Hamilton, O. during the summer. Franchises for extensive trackage have been secured.

JEFFERSONTOWN, KY. — Arrangements for the extension of its lines to this city have been practically completed by the Louisville Lighting Company. The Jeffersontown Commercial Club is interested.

WHEELING, W. VA.—The Wheeling Country Club has plans for the installation of a private electric plant and will carry out an extensive scheme of illumination throughout the grounds as well as the club house.

SYLVAN BEACH, TEX.—Wm. C. Clark is preparing to install an electric power and lighting plant here. Transmission lines will be constructed from the proposed plant to La Porte, Bay Ridge and Mogran's Point. D.

SAN ANGELO, TEX.—The municipal electric light, power and waterworks plants and distributing system have been purchased by A. E. Pitkin & Company, of New York. The new owners will make improvements to the property. D.

LOUISVILLE, KY.—F. H. Miller, superintendent of motive power of the Louisville Railway Company, is completing plans for the new power house, which will be built by that company at Twenty-Eighth and High Streets. Contracts will be let in the near future.

MOUNT OLIVER, PA.—Mount Oliver Electric Company and Carrick Electric Company have been incorporated, each with a capitalization of $5,000, to operate in Carrick. The incorporators are Donald Thompson, Edgeworth; C. B. Pritchard and M. V. Copeland, Pittsburgh.

MOUNT OLIVER, PA.—Baldwin Electric Company and Concord Electric Company, each with a capitalization of $5,000, have been incorporated to operate in Lower St. Clair. The incorporators are C. B. Merhard and Joseph A. Jenkins, of Pittsburgh, and E. N. Barber, of Crafton.

PHILADELPHIA, PA.—Montgomery, Clothier & Tyler, bankers of this city, have purchased the control of the Clarksville (Tenn.) Railway & Light Company, and are planning improvements. This concern is the interest back of the Kentucky Public Service Company, it is stated.

WHEELING, W. VA.—Architect C. W. Bates is awarding contracts for the construction of a five-story business block on Main Street. The building will be equipped with two passenger elevators and an electric crane. Contracts for electrical power, for lighting, etc., will be awarded later.

MARTINS FERRY, O.—T. K. Maher, vice president of the Belmont Coal Mining Company, has announced that extensive improvements will be made to the properties of his company in Belmont County, including the electrification of a number of mines. The principal offices of the company are in Pittsburgh.

DALLAS, TEX.—The City Commission has requested Leon M. Taylor, city electrician, to prepare estimates of the cost of installing a plant and system for supplying the city of Dallas with its own electric power and street lights. The estimate which the city electrician will prepare will be based upon about 1,500 arc lights. D.

AUSTIN, TEX.—City Water Power Company has been chartered with a capital stock of $200,000 to complete the city's concrete dam and enlarge the lighting and power plant. H. B. Freeman, Jr., Hartford, Conn., is president of the company; Charles F. Roberts, New Haven, Conn., secretary, and Frank S. Taylor, engineer in charge and Austin representative.

MOUNT OLIVER, PA.—Scott Electric Company has been incorporated to operate in Scott Township; and Bethel Electric Company has been incorporated to operate in Bethel Township. Each has a capital of $5,000 and maintains offices at Mount Oliver. The incorporators are Walter P. Rainbow, Leetsdale; Charles A. Lampe, Glen Osborne, and W. W. Murray, Bridgeville.

PORTLAND, ME.—The Tennessee Railway, Light & Power Company has been organized in this city with a capitalization of $70,000,000. The purpose of the company is to organize the Tennessee Power Company, which will at once add 15,000 horsepower to the waterpower properties of the former company on the Oconee River. A new hydroelectric development will be constructed on the Oconee River, which will be capable of 20,000 horsepower.

OKLAHOMA CITY, OKLA.—The Oklahoma Power & Electric Company has awarded the engineering firm of Croslen & Chappelle the contract for designing the plans for its new power plant, which will cost approximately $1,500,000, and will be located 10 miles from Durant. The plant will have a capacity for developing 100,000 horsepower. It is planned to transmit the electricity to Fort Worth, Dallas, Oklahoma City, Little Rock, Texarkana and other cities in Oklahoma, Texas and Arkansas. P.

## TELEPHONE AND TELEGRAPH.

*(Special Correspondence.)*

ENDERLIN, N. D.—The Moore & Liberty Telephone will build an extension into Owego. C.

CROSBY, MINN.—A franchise has been granted to the Aitkin-Deerwood Telephone Company.

COOPERSTOWN, N. D.—The Griggs County Telephone Company will extend its system. C.

DEVILS LAKE, N. D.—The Northwestern Telephone Company will improve its local system.

WHITE BEAR LAKE, MINN.—The Tri-State Telephone Company will install a new switchboard. C.

BROWERVILLE, MINN.—The East Hartford Telephone Company has been organized by Theodore John and others.

BENSON, MINN.—The Swift County Telephone Company will rebuild its system and construct more cables. C.

LANCASTER, WIS.—The Wisconsin Telephone Company will improve its local system at a cost of $1,200.

DETROIT, MINN.—The Height of Land Telephone Company has been organized, and work on the line will soon be commencd. C.

OSTRANDER, OHIO.—The Delaware Union Mutual Telephone Company has been incorporated by C. J. Eckelberry and others.

PARKERSBURG, W. VA.—The Bell Telephone Company, it is reported, will expend $15,000 for extensions and improvements to its system.

CLINT, TEX.—The Clint Telephone Company has adopted plans for the construction of several extensions of its long-distance system. D.

JANESVILLE, WIS. — The Rock County Telephone Company will erect a building and install a new system, and more lines will be constructed.

CEREDO, W. VA.—Millcreek Telephone Company, composed of William Ferguson, William Hoback and others, contemplates building a telephone system here.

INDIANAPOLIS, IND.—Alberring Telephone Company, has been incorporated with a capital stock of $500 by Herman Alberring, Henry Duwe and others.

WASHBURN, ILL.—Washburn Telephone Company has been incorporated with a capital stock of $9,000 by Oscar E. Shepard, C. E. Spangler and John Jaquot.

CHIPPEWA FALLS, WIS.—The Northern American Telegraph Company will build from here to Eau Claire and also from Rugby Junction to Milwaukee. C.

KEOKUK FALLS, OKLA.—Keokuk Falls Telephone Company has been incorporated with a capital stock of $3,000 by Fred O. Trick, C. A. Trick and U. S. Trick.

CHILHOWIE, VA.—Love Mill Telephone Company has been incorporated with a capital stock of $5,000. W. C. Parks is president and J. E. McSpadden, secretary.

KINDRED, N. D.—A new telephone line to be known as the Barrie line will be constructed by the farmers Northwest of here to connect with the local exchange. Ole Grant is interested.

GEORGES CREEK, TEX.—The Citizens Telephone Company has been organized here with a capital stock of $2,400. The incorporators are T. A. Duncan, R. D. Ratliff and W. T. Howth. D.

SEALE, ALA.—B. G. Jennings is president of a company which has been organized to construct a long-distance telephone system to connect with that of the Southern Bell Telephone & Telegraph Company.

PRINCETON, MINN.—The Princeton Short Line Telephone Company has been organized by the farmers near Germany, and Edward Beneman elected president. A line will be built to connect with the local exchange. C.

COLOME, S. D.—Clark Briggs, of Wewela, is president, and J. M. Miller, Colome, is secretary-treasurer of a company formed to build a telephone line from Colome to Wewela. The work of construction will soon be started.

CANADIAN, OKLA. — Pittsburg County Telephone Company has been incorporated with a capital stock of $1,000. The incorporators are D. L. Roe, W. L. Belt, F. G. Gillock, T. D. Luper, W. P. Lewallen, M. W. Priddy, J. L. Wood, J. D. Fulton and W. A. Byers, all of Canadian.

WENDELL, MINN.—Wendell Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are S. S. Wangsness, Andrew Hawkenson, Elbow Lake; M. E. Bergerud, Fergus Falls; T. A. Boyd, M. L. Adams, H. T. Haavig, C. E. Prestrud, Erik R. Baasen and H. G. Lillemoen, of Wendell.

## ELECTRIC RAILWAYS.

*(Special Correspondence.)*

WEST BEND, IOWA.—A franchise has been granted to the Davenport, Iowa City & Western Traction Company.

GREENWOOD, MISS.—Local capitalists are promoting plans for the construction of an electric railway between Greenwood and Itta Bena.

DAYTONA, FLA.—Scholz Railway & Electric Company will build an interurban to Deland; also to Daytona Beach and Seabreeze.

JEFFERSON, WIS.—The Badger Railway & Light Company has started surveys for the proposed electric line from here to Whitewater. C.

SHREVEPORT, LA.—The Shreveport Traction Company has been voted a franchise to build an electric railway to the Cedar Grove factory, a distance of three miles.

OLATHE, KANS. — Announcement has been made that the Strang line will be extended from its terminus at Olathe to Topeka. W. B. Strang has the matter in charge.

OGDEN, UTAH.—The Twenty-Fourth Street car line of the Ogden Rapid Transit Company will be built at an early date. It is expected that the cost of this line will be $16,000.

WEBSTER CITY, IOWA.—Fort Dodge, Des Moines & Southern Interurban Company will make the Lehigh short line, which they bought two years ago, an electric line. C.

KNOXVILLE, TENN.—The Knoxville Railway & Light Company is reported contemplating the extension of its Kingston Pike Line to Lyons View, a distance of over three miles.

MACHIAS, ME.—It is reported that the Lubec, East Machias & Machias Electric Railway Company is contemplating building an electric road connecting Machias, East Machias, Cutler and Lubec.

FARIBAULT, MINN.—The Dan Patch Company has leased the Gre t Western tracks between here and Northfield. Work will be started at once on the line from here to Owatonna. C.

HENDERSON, KY.—The Commercial Club has under consideration a plan to build a traction line six miles long to Dam 48, which is being built on the Ohio River by the United States Government.

MEZA, ARIZ.—It has been voted to grant the Salt River Railroad a franchise in this city. Work will commence at once and the company promises to have cars running within 18 months.

SPRINGFIELD, ILL.—The State Board of Agriculture has granted a franchise to the Springfield & Northwestern Interurban Railway Company to construct a line along the west side of the fair grounds.

AUBURN, CAL.—G. B. Herrington is interested in the proposed electric railway for this town. The town has been asked for $30,000, and it is stated that a large portion of this amount has already been subscribed.

ANAHEIM, CAL.—A company to be known as the Anaheim City & Interurban Railway Company has stated its intention of filing articles of incorporation. William Gerdes and W. E. Jones are the promoters.

ALBERT LEA, MINN.—The Sioux

Falls & Southern Minnesota Traction Company will begin the construction of the south state line this year. The right of way from here to Worthington has been contracted for. C.

GLASGOW, KY.—The Kentucky Central Electric Railway Company, of which J. M. Richardson, Glasgow, Ky., is president, is considering building an electric road from Glasgow to Burnside, by way of Monticello, Ky.

BLUEFIELD, W. VA.—George L. Carter, builder of the Carolina, Clinchfield & Ohio Railway, has plans for the building of a new trolley line to connect this city with Caretta and Coalfield. The line will be about 20 miles in length.

HOUSTON, TEX.—Announcement is made by the Houston Electric Company of the extension of the lines of the Houston electric railway system to provide transportation facilities between Port Houston and the Harrisburg Road. The line will pass through Central Park and enter Magnolia Park.

CHICAGO, ILL.—The Chicago Short Line Railway Company has been incorporated with a capital stock of $25,000 by A. H. Patch, F. G. Wetmore, Alexander Robertson, George W. Shepperd, William F. McCormick, W. N. Smith and others. The purpose of the company is to build an electric line from Lancaster to Chicago.

CHARLESTOWN, W. VA.—A charter has been issued to the Charlestown Traction Company to construct a traction line from St. Albans to Mount Carbon. The company is capitalized at $250,000 and has the following directors: W. G. MacCorkle, S. B. Chilton, W. T. Moore, George E. Sutherland and S. Hess, all of this city.

SAN FRANCISCO, CAL.—According to the plans of the directors electric power will be substituted for the steam locomotives on the road to the top of Mount Tamalpais. It is planned to double the capitalization of the road and immediately let the contracts for the electrical equipment and bring the road up to the highest modern efficiency.

ELLWOOD CITY, PA.—H. W. Hartman, of this city, is at the head of a project for the erection of an electric line connecting this city with Kopell, Pa., and has announced that by the middle of summer surveys will be completed and right of way obtained. Contracts will be let in time to start grading before winter.

WADESBORO, N. C.—The Wadesboro Street Railway Company has been incorporated with a capital stock of $5,000. The incorporators are Charles E. Johnson, Raleigh; James A. Hardison, Thomas F. Jones, W. R. T. Bennett, Jr., H. W. I. Little, U. B. Blalock, F. M. Hightiwer, Fred J. Cox, C. W. Thomas and R. B. Medley, of Wadesboro.

INDIANAPOLIS, IND.—Articles of incorporation have been filed by the Indianapolis, Crawfordsville & Danville Electric Traction Company, with a capitalization of $600,000. The incorporators are Fred A. Likely, H. E. Clayton and Henry H. Hornbrook. The object of this corporation is to take over the Indianapolis, Crawfordsville & Western Traction Line, known as the "Ben-Hur" line, and construct an extension from Crawfordsville, Ind., to Danville, Ill. S.

## NEW INCORPORATIONS.

TACOMA, WASH.—Rainy Valley Electric Company has been incorporated with a capital stock of $25,000 by T. F. Palms, M. T. Slade and others.

GALVESTON, TEX.—Texas Electric Construction Company has been incorporated with a capital stock of $1,009 by Ben G. Hamlett, Fred A. Wolters and W. D Baggett.

OKLAHOMA CITY, OKLA.—Railway Construction Company (Electric) has been incorporated with a capital stock of $5,000 by Carlos Combs, L. Langford and E. L. Cole, all of Oklahoma City. P.

WAPAKONETA, O.—The Cronin Electrical Appliance Company has been incorporated with a capital stock of $10,000 by E. C. Riddle, W. W. Whittington, Jeremiah Cronin, Joseph Burns and J. H. Musser.

NEW YORK, N. Y.—Greenway Electrical Specialties Company has been incorporated with a capital stock of $5,000. The incorporators are William R. Greenway, John A. Greenway and Charles Rothlisberg, all of Brooklyn.

CHICAGO, ILL.—Dolly Electric Specialty Company has been incorporated with a capital stock of $9,000 to deal in automobile electric supplies. The incorporators are Edward W. Dolliver, William M. Pearl and Wilbert A. Fochtman.

NEW YORK, N. Y.—Knickerbocker Chandelier & Electric Supply Company has been incorporated with a capital stock of $5,000. The incorporators are Abraham Liroff, New York City; Adolph Liroff and Annie Liroff, both of Brooklyn.

NEW YORK, N. Y.—Ibero-American Utilities Company has been incorporated with a capital stock of $25,000 to deal in electrical goods. The incorporators are Rapelje Howell, William H. Hawkins and Jose V. Usera, all of New York City.

NEW YORK, N. Y.—Roeser & Sommer Company has been incorporated with a capital stock of $20,000. The incorporators are Christian Roeser, Charles R. Sommer and Edward G. Sommer, all of New York City. The company will deal in electric lighting fixtures.

VINCENNES, IND.—Articles of incorporation have been filed by the Traction Appliance Company for the purpose of manufacturing a traction appliance invented by George E. Henry. The new company is capitalized at $25,000. The officers of the new company are: President, Fred C. Morgan; vice-president and general manager, George Henry; secretary-treasurer, Joseph J. Risch. S.

## PROPOSALS.

ELECTRICAL SUPPLIES.—The Navy Department, Bureau of Supplies and Accounts, Washington, D. C., will receive sealed proposals until May 28 for 42 transformers to be delivered at Mare Island, Cal., as per Schedule 4531, and 2,000 feet of duplex telephone wire to be delivered at Iona Island, N. Y., as per Schedule 4536. Schedules may be obtained from the Navy Pay Office nearest each Navy Yard. In making application the schedule number should be given.

ELECTRIC CONDUITS AND WIRING AND LIGHTING FIXTURES.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until May 31, for electric conduits and wiring, and lighting fixtures of a two-story building for the post office at Charleroi, Pa.; until June 4 of a two-story building for the post office at Santa Barbara, Cal.; until June 5 of a four-story building for the post office and court house at Muskogee, Okla. Specifications may be obtained from the office of the Supervising Architect or from the custodian of the various sites.

## FOREIGN TRADE OPPORTUNITIES.

(Parties interested in the following items should address the Bureau of Manufactures, Washington, D. C., and refer to the file number noted.)

NO. 8652. BATTERY TELEPHONES.—The Postmaster General, Perth, Western Australia, has issued a call for tenders for the supply of common battery telephones (schedule No. 190). Details are not supplied.

NO. 8654. CABLE AND SWITCHBOARD.—Forms of tender may be obtained of the Postmaster General, Melbourne, Australia, for supplying 24½ miles of paper-insulated lead-covered cable; 12½-pound conductors, 52, 26, 13, and 10 pairs (schedule No. 672, spec. No. 369); 30 miles of paper-insulated lead-covered cable (schedule No. 671, spec. No. 369); 699 relays, nonpolarized, 150 ohms resistance. Tenders must be received by May 21. The same official will receive, not later than June 23, tenders for the supply of nine sections of lamp-signaling trunk-line switchboard.

## FINANCIAL NOTES.

General trade conditions continue to improve, railroad gross tonnage as reported for the past two weeks making a very favorable comparison with a year ago. Bank exchanges exceed those of the corresponding period of a year ago by a goodly percentage. The weather during the past week has been more favorable to crop preparation and growth in the northern half of the country, and there is now prevalent a disposition to take a more cheerful view of crop prospects. It is expected also that a more favorable note will be struck regarding the opportunity for big crops in the south. Iron stocks are diminishing, and a further effort to raise prices in steel materials will be made. An improvement in both pig iron and steel is reported. Copper holds good, with a strong indication of a staple market, and there is every likelihood that with the opening wide of the construction season the demand for electrical material will be greatly increased, and an opportunity made for establishing better price conditions in all lines than has been possible for a long period.

A mortgage for the sum of $750,000 from the San Angelo (Tex.) Water, Light & Power Company to the Commercial & Continental Trust & Savings Bank, of Chicago, has been filed with the County Clerk.

Harris, Forbes & Company, New York City, offer $5,000,000 first-mortgage bonds of the Adirondack Electric Power Corporation at around par. The bonds are dated January 1, 1912, and are due 1962, but optional at 107½ from January 1, 1917 to 1921, and at 105 thereafter. They are tax exempt in New York state.

Stockholders of the Edison Company

of Boston, at a special meeting, authorized purchase of Hyde Park and Weston Electric properties and voted to issue 26,007 additional shares of stock, which, if approved by the Gas Commission, will be offered for subscription to stockholders in the ratio of one new share for each six shares now held.

The Public Service Company of Northern Illinois announces an issue of $3,000,000 new preferred stock, to be offered to holders of record May 4 at par and accrued interest, to May 18, date of issue. First offering of Public Service preferred, made a few months ago, was at ninety-seven and is now around 107. Stockholders are entitled to subscribe to new stock at ratio of 25% of their holdings.

Paul M. Warburg, of Kuhn, Loeb & Company, New York City, was elected a director of the Westinghouse Electric and Manufacturnig Company at the monthly executive meeting of the company. He succeeds Charles A. Moore, who resigned. Kuhn, Loeb & Company has been closely identified with the Westinghouse interest for some years, having taken an active part in the re-organization of the company after the panic of 1907.

Arrangements have been made with J. P. Morgan & Company to pay off $15,000,000 one-year notes of the Interborough Rapid Transit Company, due April 29. No new public issue of securities will be made immediately in this connection. The notes to be paid off consist of $10,000,000 one-year four-and-one-half-per-cent notes, and another short-term issue of $5,000,000, which has been carried by banks. These amounts will be temporarily cared for by short-term private loans arranged through J. P. Morgan & Company, and permanent financing of them will be deferred until after the proposed new interborough bond issue for subway construction, elevated extensions and other purposes.

The Portland Railway & Light Company, of Portland, Ore., has sold $5,000,000 five-per-cent two-year notes to J. & W. Seligman Company, of New York, and E. W. Clark & Company, of Philahelphia. The company controls street railway and electric light and power properties in Portland, Oregon. Proceeds from the note sale will be used to acquire the Mt. Hood Railway & Power Company, of Portland. The notes, which are callable on sixty days' notice after November 1, 1912, are secured by the deposit of the entire issue of first-mortgage five-per-cent thirty-year bonds and all of the capital stock, $5,000,000 authorized and $1,000,000 issued, of the Mt. Hood Railway & Power Company. The Mt. Hood company operates an electric railway twenty-one miles long between Portland and Bull Run River, to be ultimately extended to Mt. Hood, about sixty-five miles from Portland.

All of the present directors were re-elected at the annual meeting of the United States Telephone Company held at Columbus, Ohio, April 22. At a later meeting all of the officers were re-elected and the directors declared the regular dividend on the outstanding preferred stock of one and one-half per cent, payable May 15.

The Illinois Northern Utilities Company has increased its capital from $1,000 to $20,000,000. This company was organized to consolidate various public utility concerns and power rights along Rock River.

The West Penn. Traction stockholders have decided to accept the proposition of the American Water Works & Guarantee Company to organize a new company to be called the West Pennsylvania Traction & Water Power Company, with a capital stock of $27,000,000 of which $6,500,000 is preferred stock.

### Dividends.

Detroit United Railway Company; a quarterly dividend of 1.25 per cent, payable June 1 to stock of record May 16.

Easton Consolidated Electric Company; a dividend of two per cent, payable May 1 to stock of record April 20.

Edison Electric Illuminating Company of Brockton; a dividend of $4 per share, payable May 1 to stock of record April 26.

Grand Rapids Railway Company; a quarterly preferred dividend of 1.25 per cent, payable May 1 to stock of record April 15.

Lehigh Valley Transit Company; a preferred dividend of one per cent, payable May 10 to stock of record April 30.

Lowell Electric Light Company; a quarterly dividend of $2 per share, payable May 1 to stock of record April 26.

National Carbon Company; a quarterly preferred dividend of 1.75 per cent, payable May 15 to stock of record May 4.

Ohio Traction Company; a quarterly preferred dividend of 1.25 per cent, payable May 1 to stock of record of April 25.

United Railways & Electric Company; a dividend of seventy-five cents per share, payable May 10 to stock of record May 2.

United States Telephone Company; a quartely dividend of 1.5 per cent, payable May 15.

### Reports of Earnings.

AMERICAN LIGHT & TRACTICN.

The report of the American Light & Traction Company for the month of March and nine months ended March 31, 1912, compares as follows:

| | 1912. | 1911. |
|---|---|---|
| March gross | $ 302,181 | $ 306,478 |
| March net | 290,307 | 298,122 |
| Three months' gross | 1,027,209 | 1,066,712 |
| Three months' net | 995,622 | 1,039,671 |

The decrease in net earnings of the American Light & Traction Company for March is due to reduction in rates and increased operating costs, occasioned by the extremely cold weather of the past winter. The total decreased revenue as a result of these two factors amounted to over $60,000. This was all overcome by increases in business, with the exception of the $7,813 decrease shown. For the three months ending March 31, the total decrease in net earnings, due to the two factors referred to, amounted to over $201,000, which, except for $44,049, has all been overcome by the increase in business.

MINNEAPOLIS ELECTRIC'S YEAR.

The report of the Minneapolis General Electric Company for the year ended December 31, 1911, shows net earnings of $895,770, against $783,394 in 1910. The income account compares as follows:

| | 1911. | 1910 |
|---|---|---|
| Gross earnings | $1,459,567 | $1,276,041 |
| Net earnings | 895,770 | 783,394 |
| Interest and taxes | 427,556 | 380,522 |
| Bond sinking fund | 50,602 | ..... |
| Preferred dividends | 60,000 | 60,000 |
| Common dividends | 211,764 | 147,074 |
| Surplus | 145,848 | 195,798 |

GENERAL ELECTRIC COMPANY.

The report of the General Electric Company for the year ended December 31, 1911, shows net earnings of $10,562,806, a decrease of $292,886 from the previous year. The income account, with charges, follows:

| | | Increase. |
|---|---|---|
| Total receipts | $73,394,378 | *$1,313,311 |
| Net profits | 10,562,806 | *292,886 |
| Dividends | 5,806,344 | 591,976 |
| Surplus | 4,756,462 | *884,862 |
| Previous surplus | 23,022,706 | 5,641,325 |
| Total surplus | 27,779,168 | 4,756,462 |

*Decrease.

CHICAGO RAILWAYS COMPANY.

The Chicago Railways Company has issued its annual report for the year ended January 31, 1912. The income statement (joint account with the city of Chicago) compares as follows:

| | 1912. | 1911. |
|---|---|---|
| Total earnings | $17,156,495 | $14,064,709 |
| Expenses and taxes | 12,113,102 | 9,845,296 |
| Balance (30 per cent) | 5,043,393 | 4,219,413 |
| 5 per cent on valuation | 3,549,018 | 2,865,531 |
| Net income | 1,494,375 | 1,353,882 |
| City proportion, 55 per cent | 821,906 | 744,635 |
| Company's proportion, 45 per cent | 672,468 | 609,247 |

Figures for 1912 include Consolidated Traction operations for full year. In 1911 Consolidated Traction operations are included only from December 7, 1910, to January 31, 1911.

SAO PAULO TRAMWAY.

The Sao Paulo Tramway Light & Power Company has issued its pamphlet report for the year ended December 31, 1911. The income account compares as follows:

| | 1911 | 1910. |
|---|---|---|
| Gross earnings | $3,595,278 | $2,949,293 |
| Operating expenses | 1,274,492 | 962,337 |
| Net earnings | 2,320,786 | 1,986,955 |
| Charges | 543,152 | 383,862 |
| Surplus | *1,777,634 | 1,603,093 |
| Dividends | 1,000,000 | 999,992 |
| Renewals, etc. | 300,000 | 200,000 |
| Surplus | 477,634 | 403,100 |

*Equal to 17.77 per cent on $10,000,000 capital stock before charging out renewals, as compared with 16.03 per cent on same stock previous year.

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

| | April 29. | April 22. |
|---|---|---|
| Allis-Chalmers common (New York) | 7/8 | 1 1/8 |
| Allis-Chalmers preferred (New York) | 3 1/4 | 3 1/4 |
| American Tel. & Tel. (New York) | 146 1/2 | 146 |
| Commonwealth Edison (Chicago) | 146 | 145 1/2 |
| Edison Electric Illuminating (Boston) | 292 | 283 1/8 |
| Electric Company of America (Philadelphia) | *12 | 12 |
| Electric Storage Battery common (Philadelphia) | 55 1/4 | 54 5/8 |
| Electric Storage Battery preferred (Philadelphia) | 55 1/4 | 54 5/8 |
| General Electric (New York) | 170 1/4 | 169 |
| Kings County Electric (New York) | 129 | 129 |
| Manhattan Transit (New York) | 1 7/8 | 1 3/8 |
| Massachusetts Electric common (Boston) | 20 1/2 | 20 1/4 |
| Massachusetts Electric preferred (Boston) | *95 | 95 |
| National Carbon common (Chicago) | 104 3/4 | 105 |
| National Carbon preferred (Chicago) | 118 | 118 |
| New England Telephone (Boston) | 156 | 156 |
| Philadelphia Electric (Philadelphia) | 18 5/8 | 18 3/4 |
| Postal Telegraph and Cables common (New York) | 86 | 83 1/2 |
| Postal Telegraph and Cables preferred (New York) | 68 1/2 | 69 |
| Western Union (New York) | 84 1/4 | 84 3/4 |
| Westinghouse common (New York) | 76 1/2 | 75 3/8 |
| Westinghouse preferred (New York) | 116 | *115 |

*Last price quoted.

## PERSONAL MENTION.

E. D. NIMS, Oklahoma City, has been appointed vice-president of the Bell Telephone Company of Oklahoma.

J. J. CAGNEY has been appointed manager of the Newburgh plant of the Central Hudson Gas & Electric Company.

FREDERICK V. HENSHAW has announced the removal of his office to the Bankers' Trust Building, 14 Wall Street, New York City.

RALPH D. MERSHON, consulting electrical and mechanical engineer, has removed his New York office to 80 Maiden Lane.

NOBLE R. FOX, dispatcher for the Ohio Electric Railway Company, has resigned to accept a position as dispatcher with the Boise & Interurban Railway Company, Boise City, Idaho.

J. E. DAVIDSON has been appointed vice-president and general manager of the Pacific Power & Light Company, as well as vice-president of the Walla Walla Valley Railway Company.

J. F. HENDERSON, division commercial superintendent of the Southwestern Telegraph & Telephone Company, Fort Worth, Tex., has been advanced to the position of representative of vice-president and general manager.

JOHN H. AINSWORTH, manager of the Home Telephone Company, Dayton, O., has tendered his resignation, to become Ohio representative of the Automatic Electric Company, manufacturers of automatic telephones and appurtenances.

H. F. PATTERSON, JR., district commercial manager for the Southwestern Telephone Company, Corpus Christi, Tex., has tendered his resignation to become associated with the Bell Telephone Company, with headquarters at Philadelphia, Pa.

C. A. GATES, who has recently been appointed general manager for the Southwestern Telegraph & Telephone Company, with headquarters at Galveston, Tex., has been in telephone work for the last 27 years, spending the last 12 in the employ of the Southwestern Telegraph & Telephone Company.

W. E. BEST, formerly treasurer of the Seattle-Tacoma Power Company, is now auditor of the Puget Sound Traction, Light & Power Company, under the consolidation of the Seattle Electric Company, the Seattle-Tacoma Power Company and the Pacific Coast Power Company, which became effective April 15.

E. J. EDWARDS, associate engineer of the Engineering Department of the National Electric Lamp Association, which is sustained by certain works of the General Electric Company, read a paper on "The Incandescent Lamp as a Station Load" before the convention of the Nebraska Electric Association, April 18.

ALEXANDER GRAHAM BELL has assumed the editorship of the *Volta Review*, published at Washington, D. C. This paper has been published for thirteen years by the American Association to Promote the Teaching of Speech to the Deaf, an organization founded by Dr. Bell. A new department dealing with scientific problems will be a feature of the paper under Dr. Bell's direction.

CECIL P. POOLE, who has been the junior editor-in-chief of our contemporary, *Power*, for the past seven years, has severed his connection with that journal and will engage in consulting-engineering practice in Atlanta, Ga., in partnership with Lamar Lyndon, of 60 Broadway, New York. The firm will operate as the southern branch of Mr. Lyndon's New York office, which will continue as heretofore. The Atlanta office will be conducted by Mr. Poole. During the past ten or twelve years Mr. Poole has made a special study of electrical machine construction and of gas-power engineering, and his knowledge of these branches of engineering ought to be of great assistance in his new work. He is widely known as a writer on both subjects and is a member of the American Institute of Electrical Engineers and of the American Society of Mechanical Engineers.

DAVID GIBSON has been hailed as the dean of the literature of business in America. He is the editor and publisher of 23 monthly magazines, chiefly house organs of great commercial institutions.

David Gibson.

Every month a vast army of workingmen receive a Gibson magazine with their pay envelopes. Mr. Gibson talks to them man to man in the terms they understand. He is doing more today probably than any other man to start men thinking straight. He is an untiring worker, and having made a close study of shop, factory and business conditions in every industry, he is in a position to reflect the most practicable ideas and suggestions for increasing efficiency and establishing mutual respect and cooperation between employee and employer. Mr. Gibson will address the Electric Club of Chicago at its luncheon meeting on Thursday, May 9, coming as the guest of the Electric Club through the courtesy of William M. Connelly, secretary of the Club.

## OBITUARY.

GEORGE H. HUBBARD died at Jersey City, N. J., on April 10, after a protracted illness. Mr. Hubbard was born in 1868 and entered the service of the New York & New Jersey Telephone Company in 1889. He afterwards became wire chief of the district, and later went to Jersey City as district inspector and chief foreman of installations. Since 1908 he had been assigned to right-of-way work. Mr Hubbard is survived by his wife, two sons and two daughters.

FRANK C. SIMPSON died suddenly at Kansas City, Mo., on April 6. Mr. Simpson was born August 1, 1869. While attending the University of Kansas he became an operator in the Lawrence telephone exchange and was rapidly advanced, holding the position of manager in a number of different cities. In 1903 he became superintendent at Kansas City, Mo., and 1906 he was appointed purchasing agent for the Missouri & Kansas Telephone Company. In 1910 he assumed a similar position with the Pioneer & Bell Telephone Company of Missouri. He is survived by his wife and two sons.

CHESTER G. WILKINS, of Brooklyn, N. Y., while suffering from nervous hysteria, due to a breakdown, shot and killed himself with a revolver at the W. J. Brown Sanitarium at Cold Spring, N. Y., on Saturday, April 20. Mr. Wilkins was head consulting engineer of the Thompson-Starrett Company and had been a resident of Brooklyn for more than ten years. His health remained poor following a long illness last fall, and ten days ago he broke down with nervous prostration. Mr. Wilkins had been connected with the Thompson-Starrett Company for twelve years. He was a prominent member of the Lafayette Avenue Presbyterian Church and had been very active in church work, particularly as a community and settlement worker.

## DATES AHEAD.

American Institute of Electrical Engineers. Schenectady, N. Y., May 17.

Arkansas Association of Public Utility Operators. Annual convention, Little Rock, Ark., May 20-22.

Oklahoma Electric Light, Railway & Gas Association. Annual meeting, Oklahoma City Okla., May 22-23.

Mississippi Electric Association. Fourth annual convention. Vicksburg, Miss., May 28-30.

American Society of Mechanical Engineers. Spring meeting, Cleveland, O., May 28-31.

National Electric Light Association. Annual convention, Seattle, Wash., June 10-14.

Minnesota Electrical Contractors' Association. Annual convention, Duluth, Minn., June 16.

Michigan Section of the National Electric Light Association. Annual convention on board the *Majestic*, sailing from Port Huron, Mich., on June 21.

National District Heating Association. Annual convention, Detroit, Mich., June 25-27.

Society for the Promotion of Engineering Education. Annual meeting, Boston, Mass., June 25-27.

American Institute of Electrical Engineers. Annual convention, Boston, Mass., June 25-28.

National Electrical Contractors' Association. Annual meeting, Denver, Colo., July 16-19.

Ohio Electric Light Association. Annual convention, The Breakers, Cedar Point, O., July 17-19.

International Association of Municipal Electricians. Annual convention, Peoria, Ill., August 26-30.

Association of Iron and Steel Electrical Engineers. Annual convention, Hotel Pfister, Milwaukee, Wis., September 16-21.

The 1912 Boston Electric Show, Mechanics' Building, Boston, Mass., September 28-October 26.

American Electric Railway Association and its five affiliated associations. Annual convention, Chicago, Ill., October 7-11.

Kansas Gas, Water, Electric Light and Street Railway Association. Annual meeting, Manhattan, Kans., October 17-19.

# With the Electrical Manufacturers

**The M. W. Dunton Company,** 65 Atlantic Avenue, Providence, R. I., is prepared to send out to purchasers of wiring supplies sample cards of its tapes and sleevings, also samples of Nokorode soldering paste.

**The Franks Manufacturing Company,** of Rock Island, Ill., has received the contract for the equipment of the large harness shop at the Rock Island Government Arsenal with an improved lighting system. The Franks patent adjustable fixtures will be installed.

**The Bridgeport Brass Company,** 164 Crescent Avenue, Bridgeport, Conn., is sending out illustrated folders to show that its Phono-Electric trolley wire is adapted to every kind of overhead construction and is suitable for the lightest to the most severe service requirements where reliability and long life are desired.

**J. A. Clark & Company,** New York, announce that after May 1, they will occupy offices in the New Bankers' Trust Company Building, Wall and Nassau Streets. The company is the eastern representative of the Chicago Savings Bank and Trust Company Bond Department and handles electrical and automobile securities.

**The Mechanical Appliance Company,** Milwaukee, Wis., manufacturer of Watson motors, owing to extensions in its line of single-phase and polyphase motors, has been compelled to move its offices and engineering department into a newly erected office building. The extra space made available by this removal will be used for manufacturing purposes.

**The Westinghouse Electric & Manufacturing Company,** East Pittsburgh, Pa., has issued circular No. 1088, devoted to three-wire direct-current generators. These are provided with special collector rings to which a balancing coil set is connected. The circular describes and illustrates these type Q generators, discusses their applications, permissible unbalance, tests, ratings, etc.

**The Crocker-Wheeler Company,** Ampere, N. J., has issued bulletin No. 141, which is devoted to its form R 25-cycle polyphase induction motors. Their construction is fully described and illustrated. Both squirrel-cage and slip-ring rotors are made, as well as appropriate starters for these motors. The bulletin points out the advantages of Crocker-Wheeler construction, particularly as to the C-W. magnetic slot bridges.

**The Diehl Manufacturing Company,** Elizabethport, N. J., has opened a branch office at 1117 Olive Street, St. Louis, Mo. The increasing volume of business in and near St. Louis and throughout the Southwest, which has heretofore been handled from the Chicago office, made it advisable to establish a branch in this district to expedite the proper handling of inquiries. The new office is under the management of L. W. Carnahan. A large stock of Diehl electrical apparatus is kept on hand.

**The Hartford Time Switch Company,** 97 Warren Street, New York City, is sending out to central stations and contractors circulars giving the many convincing talking points of its five principal types of time switches. In these devices a reliable marine clock mechanism and a high-grade rotary or knife switch are employed. Although used principally for the automatic control of store-window and sign lights, the Hartford time switches are finding increasingly numerous applications for other circuits.

**W. N. Matthews & Brother,** 3736 Forest Park Boulevard, St. Louis, Mo., are publishing a new book showing the latest methods for the construction of pole lines and the use of Matthews guy anchors. These guy anchors have been very popular with lighting and power, and telephone and telegraph companies, particularly where it becomes necessary to place an anchor in a garden or lawn. The installation of the Matthews guy anchor requires no digging or disturbing of the grass or roots, in fact, it does not disturb the soil in any way.

**The Railway Storage Battery Car Company,** New York, N. Y. has been organized by F. J. Lisman & Company and associates to finance and sell the output of the Edison-Beach car-manufacturing plant. T. D. Rhodes, vice-president of the New York, Westchester & Boston Railway Company and receiver of the Detroit, Toledo & Ironton Railway Company, retires from his connection with those properties to become president of the new company. The manufacturers of the Edison-Beach cars have the exclusive right to use Edison storage battery as applied to railway equipment.

**The Duncan Electric Manufacturing Company,** LaFayette, Ind., is now supplying the trade with a full line of alternating-current and direct-current watt-hour meters, and is calling special attention to its new alternating-current induction watt-hour meter, model M, which has a driving torque of 109 millimeter-grams; also the new model R shunted-type direct-current switchboard watt-hour meter. The latter is of the multipolar type and is guaranteed to be positively astatic. It is finished in either polished copper or hard-rubber black, and for switchboard work is described as presenting a most pleasing appearance. The Duncan Company is also designing a full line of sign-lighting and bell-ringing transformers, descriptive and illustrated matter pertaining to which will be mailed upon application.

**The Buffalo Electric Vehicle Company,** Buffalo, N. Y., which was organized three weeks ago with a capital of $1,000,000, has just announced its first permanent list of officers, as follows: President, Samuel J. Dark, secretary of the Buffalo Dredging Company, secretary of the German Rock Asphalt Company, and director of the Commonwealth Trust Company; vice-president (in charge of manufacturing), A. A. Landon, superintendent of manufacturing of the American Radiator Company; vice president (in charge of sales), William A. Morgan, district manager of Swift & Company, president of the Buffalo Taxicab Company and director of the Buffalo Copper & Brass Rolling Mills; treasurer, Harry Gates, first vice president of the Buffalo Union Furnace Company, treasurer of the Lafayette Hotel Company and vice president of the Commonwealth Trust Company; secretary, Alfred W. Thorn, president of the Thorn Cement Company and director of the Commonwealth Trust Company. The new company has purchased all the capital stock of the Babcock Electric Carriage Company, the Clark Motor Company, the Buffalo Automobile Station Company and the Buffalo Electric Carriage Company.

**The General Electric Company,** Schenectady, N. Y., has issued a number of valuable bulletins which will doubtless be of much interest to our readers. Bulletin No. 4922 deals with the applications of electricity in metal mines; it fully describes and illustrates several modern installations of electrical mining machinery. Bulletin No. 4915 describes the company's type CVC direct-current motors; these are commutating-pole machines that embody certain improvements over those described in the company's previous bulletin on this subject. Bulletin No. 4933 is devoted to polyphase motors with riveted-frame construction; these motors are for two-phase and for three-phase circuits and designed for 25, 40 and 60 cycles. Their rating is from one-quarter to 15 horsepower. Both horizontal and vertical motors are described and a number of applications of these motors illustrated. Bulletin No. 4935 illustrates and describes a commutating-pole railway motor, which also embodies new features of construction developed to effect greater economy in operation. These motors are nearly 500 pounds lighter than similar motors of the same rating now in use. Many of the details of construction are clearly shown, also the system of ventilation employed. Bulletin No. 4943 treats of direct-current motor-starting panels for heavy service, such as in the steel and cement industries. Bulletin No. 4944 describes switchboard panels for isolated and small alternating-current plants, where the estimated capacity does not exceed 1,500 kilowatts. Bulletin No. 4934 is devoted to battery-charging rheostats of the type CR-211. Bulletin No. 4942 describes the Thomson direct-current test meter designated as type CB-4. Bulletin No. 4941 is devoted to the company's water-flow meters.

# Record of Electrical Patents.

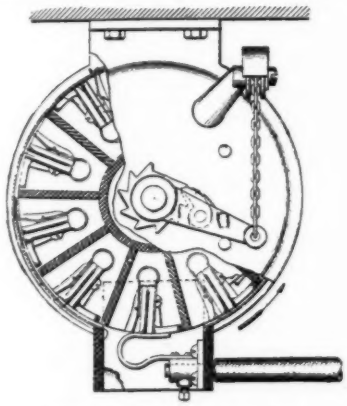
## Issued by the United States Patent Office, April 23, 1912.

**1,023,791. Universal Electric Induction Heating Element.** J. L. Anderson, Ogden, Utah. The primary coil is between two nested iron cylinders, the latter forming a short-circuited secondary.

**1,023,846. Apparatus for Use in Synchronously Operating Combined Kinematographs and Sound-Production Apparatus.** C. Milton, Hepworth, London, Eng. Two electromagnets energized in synchronism, respectively, with the moving-picture machine and the phonograph actuate a ratchet wheel that moves an illuminated differential-speed indicator.

**1,023,857. Safety Appliance for Elevators.** G. W. Lathrop and J. W. Powles, Ramsey County, Minn. An emergency car switch is operated by the cable.

**1,023,861. Secondary Battery.** P. Marino, London, Eng. The active material for the spongy-lead electrodes is made of litharge and an adhesive paste



1,023,929.—Magazine Fuse-Box.

containing glycerine, starch, lead powder and an alkaline silicate.

**1,023,875. Electric Signal Apparatus.** W. S. Reynolds, assignor to Autocall Co., Shelby, O. A contact-making device for an electric calling signal.

**1,023,879. Controlling Device.** H. W. Royce, assignor to Semet-Solvay Co., Solvay, N. Y. A pump-motor circuit is alternately closed and opened.

**1,023,886. Vibration Stop Governor.** J. E. Snyder, assignor to Colonial Trust Co., Pittsburgh, Pa. Vibration of part of the engine closes the circuit of a motor that operates the cut-off valve.

**1,023,897. Aeroplane Roundabout.** J. D. Walsh, St. Louis, Mo. The aeroplanes are propelled by electric motors supplied from the central tower by cables.

**1,023,900. Telephone System.** H. G. Webster, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. Relates to the connection of the ringing circuit to the lines.

**1,023,916. Lamp Socket.** R. B. Benjamin, assignor to Benjamin Electric Manufacturing Co., Chicago, Ill. Consists of a flattened base adapted for connection to conduit at one side.

**1,023,917. Conducting Material and Method of Producing the Same.** E. Bennett, assignor to Westinghouse Electric & Manufacturing Co. A resistance body has its specific resistance increased by subjecting it to high-frequency oscillatory currents.

**1,023,921. Magnetic Rail-Bonding Clamp.** H. P. Brown, Montclair, N. J. Includes an electric drill, an electromagnetic clamp and lamps in parallel therewith.

**1,023,929. Rotary-Magazine Fuse Box.** L. D. Epperson, Kansas City, Mo., assignor of one-third to C. H. Abbett. The fuses are carried in separate compartments of a rotatable cylindrical casing.

**1,023,936. Mechanical Interrupter for Electrical Ignition Systems.** G. Honold, assignor to Firm of Robert Bosch, Stuttgart, Germany. Includes a cam and a pair of interrupter contacts.

**1,023,942. Lamp Holder.** W. Klement, assignor to Siemens-Schuckert Werke, Berlin, Germany. Has a special auxiliary movable shield surrounding the socket shell.

**1,023,943. Indicating and Protective Device.** D. R. Knapp, Philadelphia, Pa. An electrical signaling system to indicate interference of guns for turrets.

**1,023,948. Process of Treating Wood for Use in Secondary Batteries.** P. Marino, London, Eng. Acetic acid is removed by steam under pressure; the vasculose is oxidized by hydrogen peroxide and then washed out.

**1,023,979. Starter for Electric Motors.** G. H. Whittingham, assignor to Monitor Manufacturing Co., Baltimore, Md. An electromagnetic starting and running switch.

**1,023,980. Motor Starter.** G. H. Whittingham, assignor to Monitor Manufacturing Co. Includes electromagnetic main and resistance-controlling switches.

**1,023,996. Electric Furnace.** M. R. Conley, assignor to J. E. Florence, New York, N. Y. A resistance furnace with higher resistance at the crucible than in other parts.

**1,024,025. Percussion Device.** G. H. Rowe, assignor to Electro-Magnetic Tool Co., Chicago, Ill. An electromagnetic hammer.

**1,024,026 and 1,024,027. Electromechanical Device.** G. H. Rowe, assignor to Electro-Magnetic Tool Co. Includes a plunger and sleeve provided with an air cushion to supplement the magnetic action between the plunger and sleeve when the former strikes its blow.

**1,024,029. Electric Lamp Hanger.** E. E. Schellenger, Riverside, Cal. Has a drum mounted between the suspended conductors.

**1,024,030. Hanger for Electric Lamps.** E. E. Schellenger, Riverside, Cal. A modification of the above with a differently shaped drum.

**1,024,045. Magnetic Separator.** J. Weatherby, Jr., and A. J. Dull, Harrisburg, Pa.; said Weatherby assignor to said Dull. Includes a conical magnetic pole over which the material is dropped.

**1,024,060. Electric Animal-Exterminator.** O. N. Calvert, Kahoka, Mo. Has oppositely charged contact plates mounted side by side on the base.

**1,024,061. Electric Gas-Alarm.** C. C. Clark, Guyandotte, W. Va. Variation of gas pressure rings an alarm.

**1,024,088. Signal-Transmitter for Telephone Exchanges.** G. W. Lorimer, assignor to Western Electric Co. Has a dial with closely adjoining circumferential contacts over which a contact brush sweeps.

**1,024,104. Method of Separating and Purifying Fullers' Earth and Analogous Materials.** C. C. Ruprecht, Blakely, Ala. Comprises a device for mixing the earth with water, means for removing the sand by gravity, and means for electrolyzing the mixture of earth and water.

**1,024,109. Method and Apparatus for Separating Materials.** D. W. Troy, Montgomery, Ala. Consists in feeding non-magnetic particles of different electrical conductivities in parabolic tra-

1,024,030.—Lamp Hanger.

jectories through a magnetic field, varying the field and setting up eddy currents in the particles to vary the trajectories of the differently affected particles.

**1,024,122. Brick-Making Machine.** J. R. Dawkins and D. Parks, St. Louis, Mo.; said Parks assignor to said Dawkins. An electrical means for cutting the clay into brick.

**1,024,129. Electric Lamp Socket.** G. W. Goodridge, assignor to Bryant Electric Co., Bridgeport, Conn. Has a two-part insulated base.

**1,024,131. Detector for Party-Line Telephones.** H. Y. Haley, Rushsylvania, O., assignor of one-third to H. F. Campbell and C. D. Campbell. The magneto is geared to a make-and-break contact wheel which is prevented from turning as long as the receiver is on the hook.

**1,024,150. Lubricant Device.** H. K. Sandell, assignor to Mills Novelty Co., Chicago, Ill. An electromagnet reciprocates a wick and pad.

**1,024,160. Electrolier.** T. P. Strittmatter, Philadelphia, Pa. An incandescent lamp is mounted in the center of a reflecting surface over which is a diffusing globe.

**1,024,165. X-Ray Apparatus.** H. F. Waite, Harrison, N. Y. Includes an electromagnetically operated timing device.

**1,024,184. Automatic Telephone-Exchange System.** G. Deakin, Berkeley, Cal. Relates to the automatic connector arrangements.

**1,024,185. Machine for Forming Filaments.** L. E. Dempster, assignor to General Electric Co. Includes means for squirting the filament, shaping and cutting the loops.

**1,024,205. Printing Telegraphy.** Isidor Kitsee, Philadelphia, Pa. A polarized relay governs two local circuits.

**1,024,218. Meter.** W. J. Mowbray, Providence, R. I. A motor-type watthour meter is provided with a compass and a resistance-varying device.

**1,024,225. Electric Generator.** B. P. Remy, F. I. Remy, F. P. McDermott, Jr., and J. J. Reuter, assignors to Remy Electric Co., Anderson, Ind. An ignition generator with both permanent and electromagnetic fields in parallel.

**1,024,233. Apparatus for Controlling the Traffic on Single-Line Railways.** E. Tyer, London, Eng. An electrical control apparatus for governing traffic on the tablet system.

**1,024,234. Electric Heating Unit.** T. V. Aller, assignor to General Electric Co. A resistance unit for a flatiron with the ribbon bent back and forth, adjacent loops being separated only by a film of oxide.

**1,024,238. Interlocking Device for Remote-Control Switches.** C. Wiler, assigner to General Electric Co. A locking arrangement between the operating shafts of rotary switches.

**1,024,248. Combination Binding-Post.** P. H. Capper and L. F. McCreary, Pittsburgh, Pa. Has a wire-receiving clip at each end of the bolt.

**1,024,251. Switch for Progressive Lighting.** G. T. Fielding, Jr., New York, N. Y. The magnet coil has a fixed and a movable core.

**1,024,257. Electrode.** J. Härdén, assignor to General Electric Co. A composite arc-light electrode composed of carbon, carbide of titanium and carbide of boron.

**1,024,286. Tool for Handling Electric Globe Lamps.** A. Santilli, assignor to G. Moretto, New York, N. Y. Has a suction cup for holding the large end of the lamp bulb.

**1,024,290. Trolley.** C. C. Snodgrass, New Martinsville, W. Va., assignor of one-half to I. D. Morgan. Relates to the manner of lubricating the wheel.

**1,024,293. Trolley.** P. Szuminsky, Hamilton, Ont., Can. A ball bearing is provided.

**1,024,298. Reversing Driving Mechanism.** F. D. P. Thomson, Wheeling, W. Va. The motor shafts are connected by induction clutches.

**1,024,304. Electrical Pull Socket.** D. P. Wolhaupter, Washington, D. C. Relates to details of construction.

**1,024,311. Electric-Light-Socket Handle.** F. Clapham, Glen Mills, Pa. The socket has a nipple that engages a sleeve on the handle

**1,024,321. Spark Plug.** W. Ellis, Harrod, O. Prongs adjoin the electrodes.

**1,024,353. Combined Track and Trolley Switch-Operating Mechanism.** J. E. Nicholson, Elkhart, Ill., assignor of one-half to D. Nicholson. Movement of the track switch actuates a switch between the main and branch trolley wires.

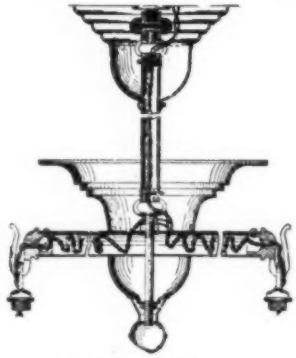
**1,024,361. Pole.** O. F. Reynolds, Petersburg, Okla. A sheet-metal pole for overhead wires has a slot for the cross-arm.

**1,024,365. Pull Socket.** F. L. Rowntree, assignor to Arrow Electric Co. Hartford, Conn. Has two porcelain base parts spaced a short distance apart.

**1,024,368. Trolley.** W. Schweppe, Pittsburgh, Pa. Has two transverse guard wheels over the trolley wheel.

**1,024,369. Chandelier.** A. Sechrist, assignor to Albert Sechrist Manufacturing Co., Denver, Colo. A horizontal lamp-supporting tubular arm passes through the canopy.

**1,024,394. Automobile Starting Device.** E. R. Brodton, assignor of one-half to J. A. Gartland, Boston, Mass., and one-fourth to R. M. Stephens,



1,024,369.—Chandelier.

Hackettstown, N. J. Has a special ignition timer connected to the cranking device.

**1,024,397. Adding Machine.** A. H. Ellis, assignor to Wyckoff, Seamans & Benedict, Ilion, N. Y. An electric controller governs a selective device for the adding wheels.

**1,024,398. Equilibrator for Airships.** D. B. Ellsworth, Portland, Ore., assignor of one-third to C. E. Houston and one-third to H. L. Lane, Portland, Ore. Is provided with pendulum-controlled electromagnetic clutches.

**1,024,410. Rotary Electric Transformer and Motor-Generator.** J. C. MacFarlane and H. Burge, assignors to Crompton & Co., Ltd., Arc Works, Chelmsford, Eng. A motor control system.

**1,024,418. Inductor Alternator.** E. Podlesak, Tiffin, O. The inductor has its arms in the form of a cross.

**1,024,444. Automatic Signal-Operator.** E. R. Gill, assignor to H. E. Merrell, New York, N. Y., and O. J. Hamlin, Smethport, Pa. A Gill selector with an automatic arrester and pause-controller, each electrically actuated.

**1,024,445. Selective Signaling System.** E. R. Gill, assignor to H. E. Merrell and O. J. Hamlin. Arranged for composite telephone and telegraph lines.

**1,024,446. Signaling System.** E. R. Gill, assignor to H. E. Merrell and O. J. Hamlin. A modification of the above.

**1,024,448. Battery-Charging Apparatus.** E. A. Halbleib, assignor to Northeast Electric Co., Rochester, N. Y. An apparatus for cutting off the charge when it is completed.

**1,024,449. Gong-Striking Mechanism.** H. J. Heeney, assignor to Holtzer-Cabot Electric Co., Brookline, Mass. Electromagnetically actuated.

**1,024,463. Pole-Changer.** E. M. Tormin, assignor to Holtzer-Cabot Electric Co. A vibratory device for telephone ringing.

**1,024,487. Telephone-Exchange System.** E. E. Clement, Washington, D. C. Relates to the automanual system wherein the exchange operators control automatic switching equipment.

### Patents That Have Expired.

Following is a list of electrical patents (issued by the United States Patent Office), that expired April 30, 1912:

538,246. Range-Finder. B. A. Fiske, United States Navy.

538,247. Electrical Signaling System. B. A. Fiske, United States Navy.

538,271. Electrically and Chemically Heated Crucible. H. G. O'Neill, Boston, Mass.

538,272. Electrical Cigar-Lighter. H. G. O'Neill, Boston, Mass.

538,275. Electrical Brake. C. E. Pearson, St. Louis, Mo.

538,281. Brush-Holder. E. D. Priest, Lynn, Mass.

538,284. Thermal Cutout Device. C. A. Rolfe, Chicago, Ill.

538,289. Manufacture of Carbon for Electrical Purposes. C. P. Shrewsbury, London, Eng.

538,325. Means for Ventilating Electric Motors on Cars. J. J. Devine, Clifton Heights, Pa.

538,327. Telephone Central-Office System. E. T. Gilliland, Pelham Manor, N. Y.

538,328. Magneto Transmitter. E. T. Gilliland.

538,329. Magneto Generator. E. T. Gilliland.

538,344. Armature for Dynamos and Electric Motors. H. Penn and L. Lowndes, London, Eng.

538,345. Dynamo-Electric Machine or Electric Motor. E. H. Porter, Radford, Va.

538,351. Electric Engine. L. M. Sabin, Washington, D. C.

538,357. Underground Electric Railway. J. F. Smith, New York, N. Y.

538,373. Conduit System for Electric Railways. F. H. Homan, Brooklyn, N. Y.

538,377. Electric Elevator. N. O. Lindstrom, Union Course, N. Y.

538,408. Electric Transmission Wheel or Trolley. C. C. Burton, Pittsburgh, Pa.

538,417. Magnetic Ore-Separator. J. Houlehan, Chicago, Ill.

538,423. Electrical Coupling. M. F. Koenig and I. Mann, Hazleton, Pa.

538,454. Telephone Switch. A. F. W. Meyer, Blue Island, Ill.

538,457. Electric Arc Lamp. J. A. Mosher, Chicago, Ill.

538,460. Diffuser for Electric Fans. C. W. McKeehan and F. B. Miles, Philadelphia, Pa.

538,474. Art of and Apparatus for Transmitting Speech. J. Absterdam, New York, N. Y.

538,590. Block System and Apparatus on Electric Railways. E. Langen, Cologne, Germany.

538,617. Commutator Brush and Means for Adjusting Same. R. Lundell, Brooklyn, N. Y.

538,628. Method of Making Electrodes for Secondary Batteries. W. L. Silvey, Dayton, O.